# AMERICAN MACHINIST

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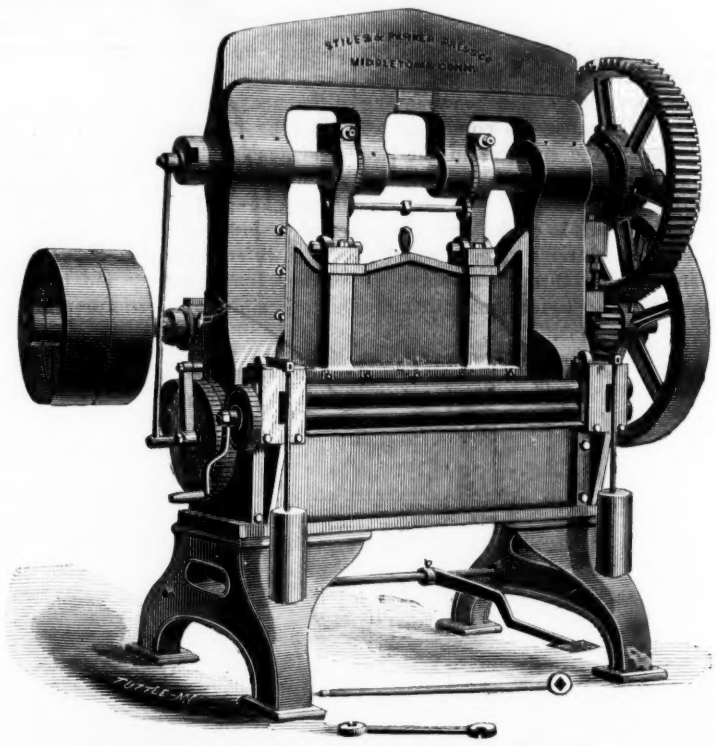
## New Sheet Metal Punching Machines.

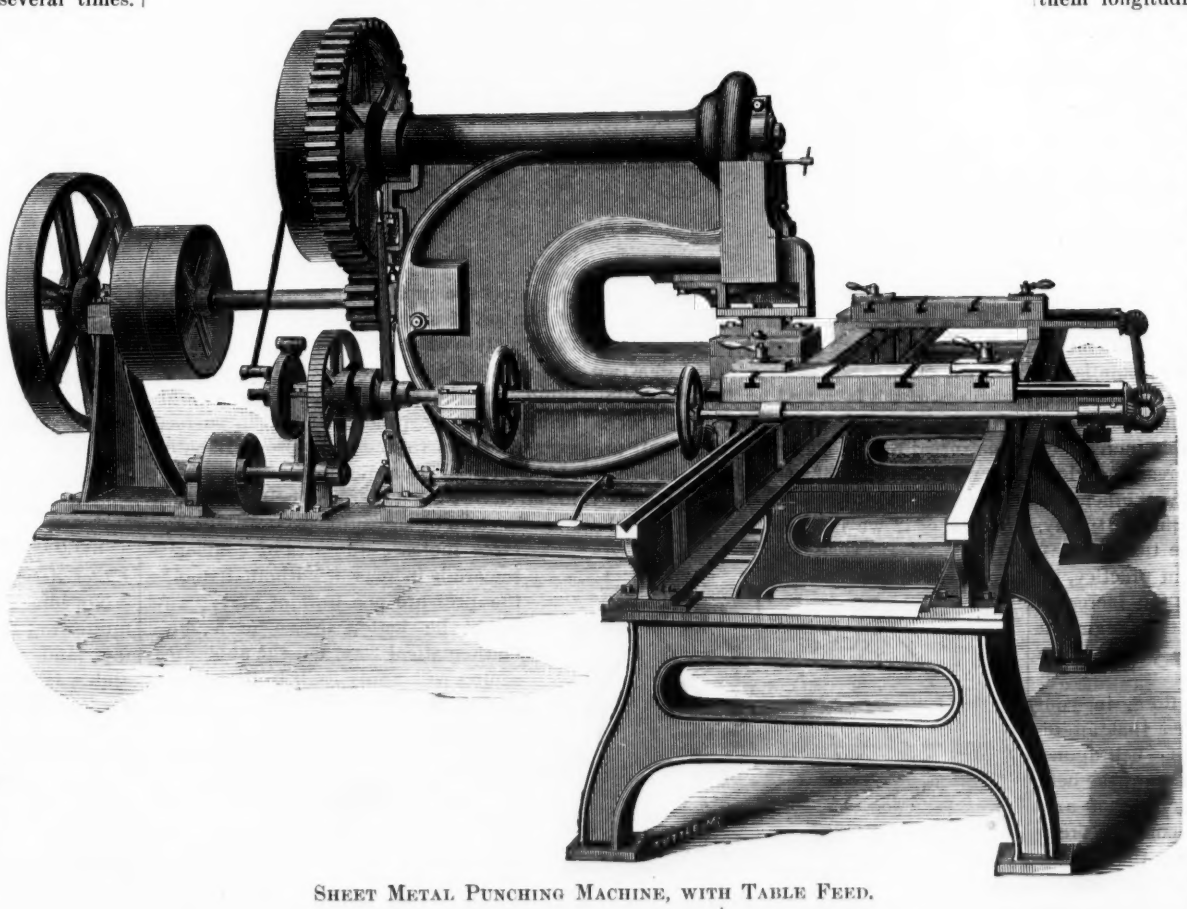
In making articles from sheet metal, especially where large quantities are used, manufacturers have experienced great inconvenience in consequence of the slow process of punching with the ordinary facilities in use. This, together with the sharp competition in business, has rendered it necessary to devise improved machinery, by means of which the work could be produced more rapidly and with less help than required to operate the machinery now used. The Stiles & Parker Press Co., of Middletown, Conn., after numerous experiments, and a long experience in the manufacture of presses, have succeeded in perfecting the machines represented by the engravings upon this page.

The sheet-metal punching machine was designed for perforating sheets of metal where a great number of holes are required.

This machine is capable of punching sheets of steel or iron 50 inches wide, and $\frac{1}{16}$ inch thick. The punch holder contains 274 punches of $\frac{1}{8}$th inch diameter, which, running at a speed of 80 revolutions, will punch 21,920 holes per minute. Thus, the sheet is perforated by passing through the machine but once, whereas on the machines formerly used, it was necessary to pass the sheet through the machine several times. This machine has an efficient and positive feed which consists of four rolls, which are placed two in front, as shown, and two at the back of the press, those at the back are for drawing the sheet through after it has passed the front rolls. These rolls are held in close contact with the sheet by means of weights, which, together with the feed rolls, may be quickly removed when necessary, to afford free access to the punches and dies. The rolls are all geared together, which insures a uniform speed. Motion is communicated to these rolls by means of a pitman and bell crank. On the end of the latter is a pawl or click which engages the teeth of a ratchet wheel joined to and running on the same shaft with a gear, which moves the rolls. The feed is regulated by adjusting a bolt in the slotted arm upon the end of the cam shaft, as represented, and may be adapted to any required length of feed.




SHEET METAL PUNCHING MACHINE, WITH ROLL FEED.



SHEET METAL PUNCHING MACHINE, WITH TABLE FEED.

For special punching when the ratchet wheel, usually placed upon the press, will not answer, other wheels may be readily furnished to meet such requirements. These ratchet wheels have graduations upon the faces to facilitate the changes. The punch holder is a long flat bar of steel, which slides through a hole cast in the side of the press into a dove-tailed recess in the cross head. The punches are placed in tapered recesses in the holder, the heads being exactly even with the top face, so that when the holder is in its place in the cross head each punch is held firmly in position. To take out a broken punch and replace it by a new one is but the work of a few moments. The punches are supported and guided by means of a stripper, which is a steel plate attached to the dies and located far enough above them to allow the sheet to pass freely between.

The holes in the stripper are just the size of those in the dies. When it becomes necessary to remove the punch holder, the punches may be raised entirely above the stripper, by an ingenious arrangement of the cams. By loosening six set screws the holder and punches may be easily and quickly removed, thus avoiding dismembering the machine.

The punches are adjusted to the die by the pitmans, which are lengthened or shortened simultaneously, thus keeping the cross head constantly true and level. The edge of the sheet to be punched should be placed squarely between the rolls, and, by turning the small crank attached to the feed gears, be brought into position with the die, ready for punching. Pressure upon the treadle will start the machine, and, if immediately removed, but one stroke of the punch will be made, the cross head stopping at the highest point. Continued pressure upon the treadle will give a correspondingly continued motion to the punch.

The machine with punching table attached, represented by the other engraving, is a general jobbing press, adapted to cases where but a small number of sheets of the same pattern or design are wanted, and where it would not pay to make a die to punch the entire width in once passing through. For this machine, a number of punches (usually varying from one to fifty, according to the number of sheets required to be punched), are made, and by passing the sheet several times through, the entire sheet is as accurately punched as in the machine previously described. Sheets varying in width from 4 inches to 50 inches, and in length from one to ten feet, can be punched in this machine. The weight of the machine, exclusive of the feeding table, is eight tons. The feeding table is twenty-six feet long. On this table are two platens, with transverse feed, which may be contracted or expanded to receive the various length of sheets to be punched. The pinions and rack that move them longitudinally, and the screws that move them transversely, are cut to fractions of an inch, so that the workman knows definitely how much he moves either, by the turns of the hand wheels. This forethought will save much time in the operation of the machine. The feed may be varied from one-sixteenth of an inch to two inches. The machine will punch a one-inch hole through iron $\frac{5}{8}$ inch thick, 25 inches from the edge of the sheet. The press may be run by belt alone, at a rapid rate for small holes, or by back gearing at a slower speed and with greater power for heavier work. It is started by pressure upon the foot treadle, and when the sheet is fed through, its quick return for further punching is obtained by the action of the hand lever shown in the cut. The press is furnished with a counter shaft and cones that will give a variation of from 40 to 100 revolutions per minute. The latter speed will be used when gangs of small punches are required. The stroke of the punch, or punch piston, on this machine may be varied from one-half to a full inch, to adapt it to thin or thick sheets, avoiding loss of time. The press has the Stiles patent adjustable attachments and stop motion. The punching plate may be brought down to the face of the die while the belt is on, and retained there as the machine runs, and the adjustment be made without running the belt on a loose pulley. The punches can be taken out or replaced without dismembering the machine. The adjustment

of the punches can be made to the minutest fraction of an inch, and to do this does not require the stopping of the belt nor the removal of the dies. The entire machine is under the control of one man, and, except the management of the sheets, may be run by him. The machine is positive in action upon either thick or thin metal, and is easily controlled by the operator.

## Letters from Practical Men.

AN ALMOST UNIVERSAL MILLING CUTTER.

*Editor American Machinist:*

Some time since there was, if I remember correctly, some talk about milling machines and milling cutters in your paper. Being interested in that line, I have been looking and waiting for an abler man than your humble servant to give us a little more light on the subject; but well knowing the value of the knowledge (the cost, too,) for a great many jobs, to be used in connection with such means of holding the work as almost all good machinists can, or at least should be able to devise, the cutter to be carried on a mandrel upon the lathe centers, it has induced me to send you the following description and sketch of our tool: *A*, is the body of the tool or holder; it is of cast iron, about 2½″ diameter by 1″ thick, and has a boss on one side about ⅜″ high. It is nicely fitted to its mandrel. It has six plain round holes ⅜″ diameter for the reception of its cutters *B*, which are held in their places by the set screws *C* bearing on them. The cutters are simply pieces of Stubs' wire, which are fitted to the holes in the holder and severally spotted for the set screws. They are then put in and turned to the desired shape, the same as any piece of work; then, after forming the cutting faces and relieving and tempering the cutters, they are ready for use. Of course, mark each cutter and each hole, so that they may be put into their original position again when once taken out. Then any number of sets of cutters may be made for the same holder, being sure to have them bottom in the holes. Our mandrel is about 10″ long, and has a place of 1″ diameter and 4″ long for the reception of cutters. It is fitted with rings of different thicknesses for convenience in adjusting the cutters. I find it, I think, enough handier than the plain style to offset its extra cost. Yours truly,

CHAS. S. BEACH.

Eagle Bridge, N. Y.

*Editor American Machinist*:

As one of the "arc of contact gentlemen," I beg to offer the following, in substantiation of what has to the writer been a fact of long experience, *i. e.*: that increasing the arc of contact of a belt will invariably increase its driving power; while to increase its width alone will have no such effect, all other conditions in each case being equal. It may, perhaps, be as well to premise that increasing the width of a belt does, in practice, increase its capacity, because the increased width adds to its weight and thus augments the tension, except in the case of the lower pulleys of vertical belts.

Your correspondent, Mr. Rose, in your issue of August 12th, assumes that an increase of the arc of contact of a belt upon a pulley, under a constant tension of the belt, is comparable to a similar increase of area of two plane surfaces under constant pressure; it being well understood that in the latter case the frictional resistance offered to the moving of one upon the other, within practical limits, remains unaltered. It can, however, easily be shown that the two cases are in no wise similar; a simple "reason" given "why increasing the arc of contact increases the driving power of a belt, which reason shall not apply as directly to the increase of area as to the increase of arc of contact," and that it may be understood that, while "the laws of friction for cylindrical surfaces do" *not* "differ from those for plane surfaces," or "that for a given weight or pressure the length is" *not* "an element on the cylindrical surface," any more than "in a plane surface," an increase

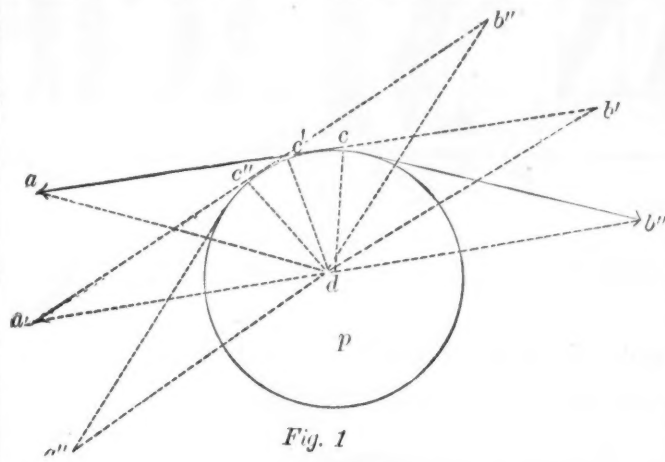



*Fig. 1*

of the arc of contact does proportionally—or nearly so—increase the frictional resistance between a pulley and its enwrapping belt; and simply because the conditions of pressure between the surfaces in the two cases are as dissimilar as are the cylinder and plane themselves.

To demonstrate this in as simple a way as possible, take an extreme case, in which a belt enwraps a pulley through so small an arc as practically to touch it at little more than a point in the circle, as in Fig. 1, in which *a*, *c*, *b* is the belt and *p* the pulley.

We make *c a*, *c b*, respectively represent the direction and tension upon the two members of the belt, and by the resolution of forces *c d*, will be the direction and pressure exerted by the belt upon the small arc enwrapped. Now if we double the arc of contact we shall have the belt represented by *a′c b*, or if we increase it three fold the belt will be *a″e b*. But we see that if the second and third are enwrapped, the surfaces are held together under precisely the same conditions, as to pressure upon the enwrapped area, as in the first arc, and the area enwrapped is not only two and three times greater respectively, but the pressure between the belt and pulley surface is equal in each arc, and therefore increases the total frictional resistance in the same ratio.

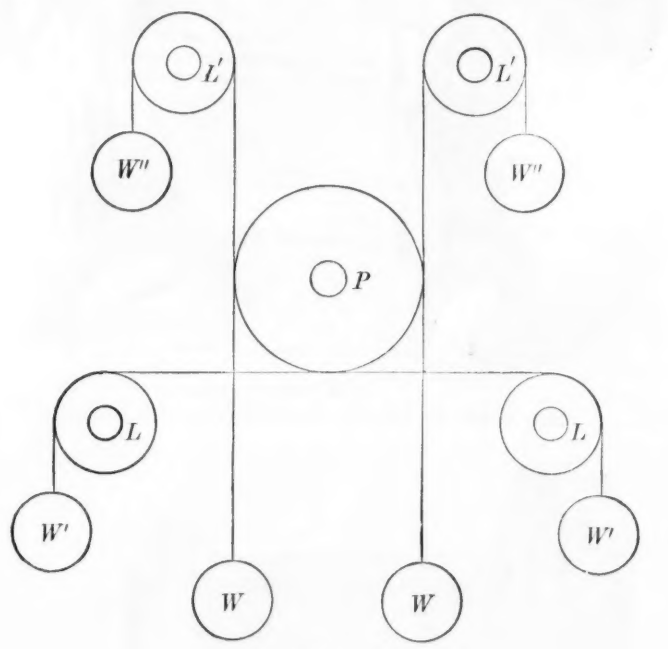
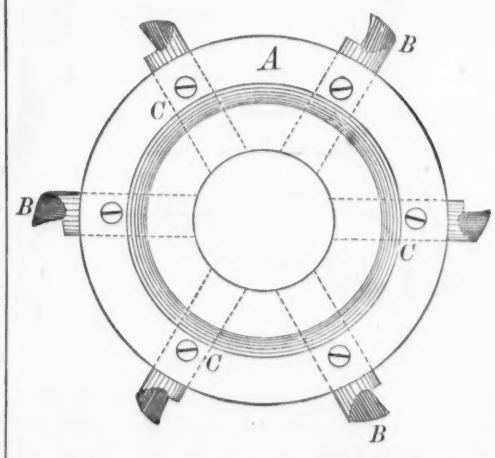



*Fig. 2*




We may conceive a belt *a′c′b′*, and still another *a″c″b″*, each enwrapping contiguous equal arcs of the pulley. It cannot be denied, in such a case, that the three belts would exert three times the frictional resistance of any one of them; and it is equally clear that the one belt *a″c″c′cb*, enwrapping three times the arc, is precisely the same as to tension and pressure on a given area as would be the three belts supposed; for it would make no difference whether the tension *c″a″*, is resisted by the tension *c″b″*, *c′b′*, or *c b*; the conditions which obtain in each additional arc enwrapped would be an equal addition to area pressed upon by the belt with the constant pressure *c d*.

The difference, then, between two plane surfaces and a pulley and its enwrapping belt, is simply one of direction, in which the forces are applied; thus varying the arc of contact of a pulley, and its bulk varies the direction of the forces, while increasing the area of a plane surface does no such thing. In the plane surface, the pressure being always perpendicular to the surface, every addition to the area proportionately reduces the pressure per unit of area; while in the case of the pulley and belt, the changing direction of pressure between the surfaces increases the area of contact as the arc is increased, without reducing the pressure per unit of area. This might be better shown in a more mathematical way, but the above reasoning will apply itself to the popular as well as to the technical reader.

Perhaps a clearer and more conclusive demonstration to some would come, if we suppose a belt enwrapping one-half the circumference of a pulley *p*, Fig. 2, the tension being procured by means of the weights *w*, *w*; the pulley being double the width of the belt or more. According to our reasoning above, with the tension *w*, *w*, remaining the same, if we could enwrap with each free end of the belt the remaining quarter of the circumference of the pulley, disposing the belt and weights as shown by the leading pulleys *L*, *L*, and weights *w′w′*, and thus have the entire circumference enwrapped, the frictional resistance should be doubled. That such would be the case may be shown, if, instead of enwrapping the remaining half of the circumference of *p*, as just supposed, with the suspended ends of the belt, we take a second belt of the same width alongside of the first, but disposed as shown by the leading pulleys *L′ L′*, and weights *w″w″*, and thus enwrapping the lower half of the circumference of *p*. The two cases would be precisely similar in all essential conditions and in effect as to frictional resistance. In each case we have a pulley completely enwrapped by a belt of given width under the given tension *W*. To deny that the last mentioned example would effect twice the frictional resistance of the first case, would be to deny that twice one is two.

Now, if instead of disposing of the belt and weights *w″w″*, as in the last case, we place it by the side of the first, but disposed in the same way with the weights *w″w″* suspended just as *w w*, we have the case of doubling the width of a belt, providing we reduce the four weights one half each, without increasing the tension or changing any other condition; and in this case the pressure per unit of area is reduced one half, while the area enwrapped is doubled, the frictional resistance neither increased nor diminished; while in our second and third cases of Fig. 2, the pressure per unit of area remains the same, the area enwrapped is doubled, and the frictional resistance or capacity of the belt increased in the same ratio.

Of course the static conditions of the example, given above, are not those of the practical working of a belt, as in the latter case the tension of the two members of a belt is unequal, the difference being equal to the frictional resistance between belt and pulley, if working up to its capacity, to drive without slipping. But our examples are equally correct when dynamically considered; for a belt enwrapping and moving over a given arc of a driven pulley, passes from a lower to a higher state of tension, and conversely for a driving pulley; but the mean tension, at or about the crown of the arc enwrapped, and total pressure of the belt in direction of radii of the pulley, will be the same as in our static examples; and if as in Fig. 1, we conceive the enwrapped arc of a pulley, in motion and transmitting power, to be divided with any number of indefinitely small arcs, the sum of the pressure *c*, *d*, will be the same, and therefore the frictional resistance or capacity to transmit power.

There will be some slight deviation from the above in practice coming from the variation in pressure on journals, due to the different directions of tension in the case of different arcs of contact, and from the creeping of the belt upon the pulley, caused by its passage from lesser to greater tension, or *vice versa*, but these are too small to be of practical account, and quite foreign to this subject.

I believe the above will fully answer Mr. Rose's "little innocent questions."

JOHN T. HAWKINS.

Taunton, Mass.

RECONSTRUCTING WORN STEEL SCALES.

*Editor American Machinist:*

Not long since "Chordal," in one of his interesting letters, drew attention to the fact (and very properly, too,) that steel scales, after having become worn on the corners, should be discarded and new ones procured, in order to preserve accurate measurements.

I have a twelve-inch scale, the corners of which were very much worn, having had it in use for a number of years; but instead of buying a new one, as "Chordal" advised, I planed about a thirty-second of an inch off of each edge, leaving the ends intact. The result is that I have a scale as good as new, the original length, with square corners, divisions and figures complete. By this means old scales may be made new without cost.

J. J. NEWBAKER.

Steelton, Pa.

Steps are being taken to establish railroad car works in Montreal. It is understood that a large concern in the United States will hold the controlling interest, and will build extensive shops, provided a reasonable amount in local subscriptions is secured.

## A Model Foundry.

In our issue for October 11th, 1879, we published an article entitled "A Model Machine Shop," which described by appropriate illustrations the elevation, plans and details of the works of the Brown & Sharpe Manufacturing Company, of Providence, R. I. Since the above article was written an extensive foundry has been added to the other buildings of this establishment, which may be properly termed "a model foundry."

As there is no doubt in our minds as to the full endorsement by our readers of the views as expressed in the article referred to, we are confident of a like verdict being rendered in this case.

The company seem to take great pleasure in providing light and well-ventilated apartments, with suitable means for making them comfortable in winter for the use of their men. Their experience has convinced them that such precautions are profitable to employers as well as to workmen.

The engraving designated Fig. 1, represents an end elevation of the main foundry building, which is 56 feet 7 inches wide, and 168 feet 5 inches long. The lower part of the building *a*, is composed of a brick wall, above which the walls are of wood. The skylight or lantern *b*, which surmounts the roof is filled with windows which may be opened, closed, or adjusted by means of an ingenious device, composed of shafting with levers attached. The foundation is represented by *c*, and the floor of the foundry by *d*. The floor is formed by a thick, unbroken body of cement concrete, as in making the castings for the use of this establishment a bed of sand is not required. The roof is braced in such a manner as to form the least obstruction to the entrance of light. The windows are placed as near each other as possible, while retaining sufficient strength in the walls. The floor space *a,a*, Fig. 2, is to be occupied by flasks, while the entrance and exit *v,v,v*, for trucks, are never to be occupied for moulding. There are a number of fire-proof safes, 7,7,7,7, for patterns. Three moulding machines or presses 5,5,5, are an important accessory to facilitate the work, together with the convenient form of moulding benches, represented by 6,6,6.

The facilities for melting iron are two cupolas located at *b*. One of these two is of 4 tons and the other three of 2 tons capacity. They are furnished with positive blast; the air pipes are placed overhead out of the way; *w* is a rattler for cleaning sprues and drippings; *c* is an elevator of 2,000 pounds capacity; 10 is a staircase leading to the floor above; *y* is the coat and wash room, heated by steam and furnished with sinks shown in our former article; 1111 are small rooms furnished with hot and cold water, so that a man may wash himself all over after his daily duties. There are no tubs in these rooms, but the floors are connected with a drain. The coal and iron is carted to an elevation back of the foundry, and being placed in a car, is taken across the bridge 8, to the cupolas. A power crane is represented by *x*, with the latest improvements. The room *d* contains the core oven *f*, which has a revolving stand within it; *g* represents the furnace, *h* a furnace for small ladles, and *e* the main chimney. The closet 4, is of an improved plan, over which is a tank of a capacity of 3,500 gallons for supplying the foundry with water. The pickling room *i*, is provided with a pickling bed *j*, and drain pit *k*, and is arranged so as to use both hot and cold pickle. The floor is laid upon timbers of creosoted spruce (which is said to be indestructible), placed in tarred concrete. The floor itself has been saturated with hot tar. The room *l*, contains three annealing furnaces *m m n*, connecting with the chimney by a flue 19; 11 is a skylight and ventilator. The rattling room *o*, has five rattlers *pp*, for all classes of work. The room *q*, is a sort of cleaning and wareroom, for the delivery of castings to the main building, which is 150 feet distant, being connected by means of the bridge.

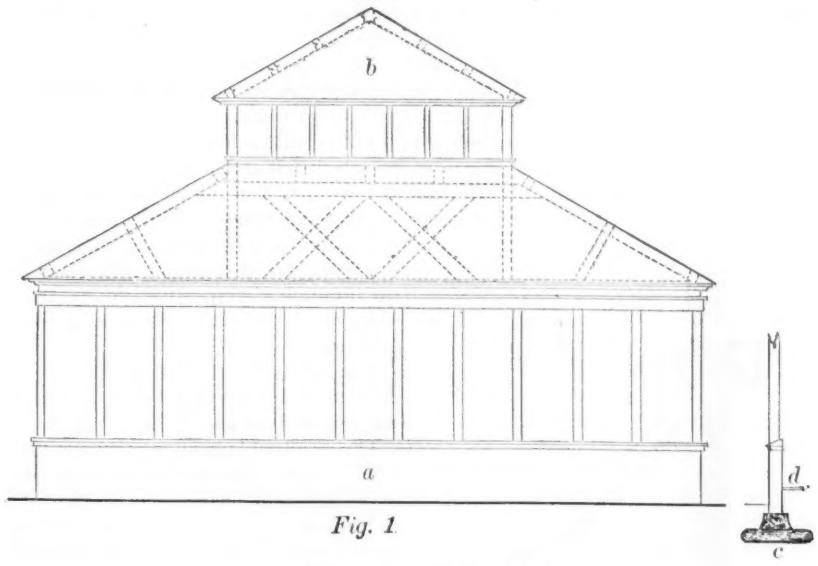



*Fig. 1.*

ELEVATION OF FOUNDRY.

The room over *q*, is used for a pattern shop, while *s*, is the office. The walls 12 to 17, are of brick, while the others are of wood. Power is communicated from the engine in the main shop by a shaft in an underground pit transmitting motion through a vertical belt to the shaft *t*. From the shaft *t* a long belt connects with the shaft *u*; thus the power is distributed to all parts of the establishment. For transporting heavy castings to the machine shops, a small car is used, passing through a brick arch underground, thus uniting the buildings.

The buildings are all to be heated by steam radiators, so as to make them comfortable even on the coldest days in winter. The condensation is to be returned to the boiler by means of a trap. This feature will well repay the company for the extra outlay, as the men need not remain at the stoves for an hour after the whistle blows in the morning, and after getting a little warmth go about their work shaking as if they had the malaria.

There is a water pipe running about the foundry to which a small hose is attached for the use of each moulder. The end of the building where the safes 7, 7, are placed is

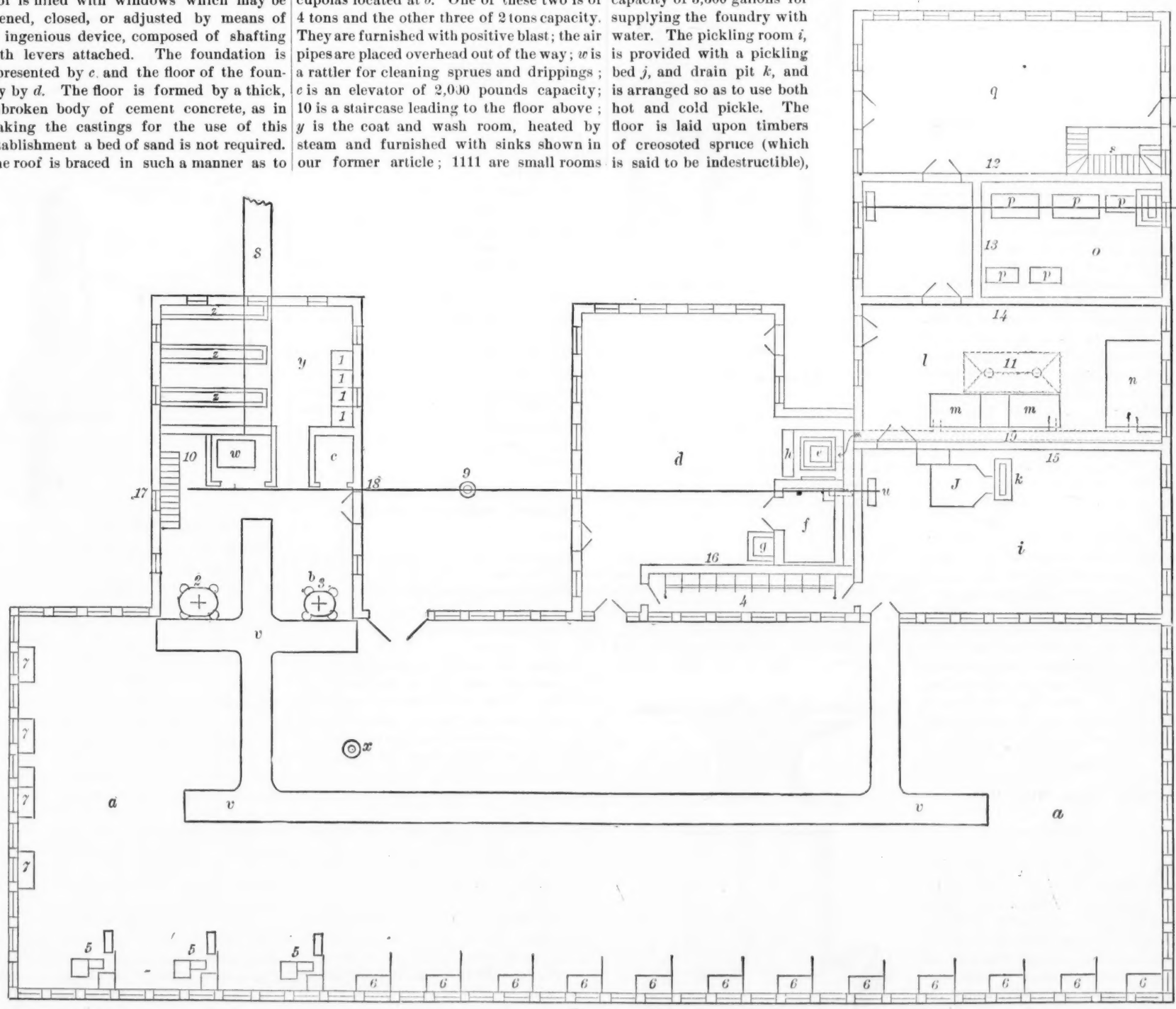



*Fig. 2*

PLAN OF FOUNDRY.

only temporary, as it is intended to be removed when it becomes necessary to enlarge the foundry. When this is done the cupolas will be central with the building, as it should be in every foundry. The moulding sand is kept in separate bins, and the same admirable system is used in this foundry as in the machine shop of the company.

## Rank and Position of the Mechanic.

At the opening of the Fifteenth Industrial Exhibition of the Mechanics' Institute of San Francisco, California, President Cornwall, of the Institute, said: It is true that, owing to our comparatively isolated position the mechanics of San Francisco have heretofore been practically limited to California, Oregon and Nevada for a market in which to compete for the sale of their products; but by the building of the Southern Pacific Railroad into Arizona the field has been greatly enlarged, and the proposed extension of the Southern Pacific and connecting roads into and through Mexico will soon open up a vast and productive field for enterprise, into which the industrious mechanics and resolute manufacturers of San Francisco can send their machines and wares for successful competition and sale, if they are so made and finished as to do credit to their craft.

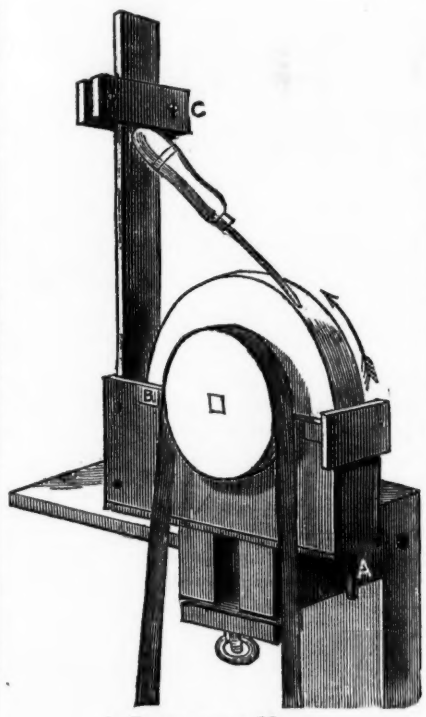
There is in the minds of many persons a prejudice against their sons being apprenticed to and educated as mechanics. I believe it is all wrong. What has mechanism done that such prejudices live? Without the mechanic the world would never have emerged from barbarism. Without the mechanic no ship would have been built in which the bold mariner could sail and discover America. The ponderous engines that drive the steamship through trackless oceans; the finest lace that is woven for the infant's couch; the houses we live in; the books we read; the clothes we wear; the table at which we sit; the plates from which we eat; this beautiful temple in which we are gathered, and all of our comfortable and ornamental surroundings here and at our homes are the products of intelligent mechanism. I believe that there is a greater proportion of useful men with happy homes among mechanics than in any other class of life, not excepting farmers.

A thorough education in any branch of mechanism does not prevent the possessor thereof from entering any of the other walks of life which may afterward seem useful and pleasant to him, but is an additional qualification for success in almost any private or public place—happily in this country there is no place so high that the humblest child or man may not aspire to it, and with studious habits, pure life and resolute determination, he may reasonably hope to succeed in writing his name high on the roll of fame. The history of our country is full of such achievements. I need go no farther for an example than point to the trained and skilled mechanic who is to deliver the oration to you to-day, who rose step by step from the printer's case to the Senate of the United States, where he was the peer of any man in that greatest of all deliberative bodies. Let us not then be afraid to educate our sons to be mechanics, but let us rather take care that the rising race of manufacturers grow up better skilled in mechanics, better reputed for quality of materials and more discerning in matters of taste. Then shall we do well for our fellow men and help to continue and increase national prosperity.

## Lighting Shops with Oil.

BY A. DOLBEER.

The time is coming when many shop men will wrestle with the problem of shop lights. A machine shop is hard to illuminate. Where gas is used the question is not so intricate, and the result is more satisfactory to all concerned, but in the many shops which do not have gas the question is vital. I have worried over the matter and experimented for years, and last fall the question was solved in our shop (no thanks to me), and now we have the best (coal-oil) lighted shop I have ever seen. We use a low tin lamp shaped like an ordinary tin cup with mammoth burner and chimney to match, with tin shade fitting close to the chimney—that is all. We had that years ago, but did not know how to use it. The way we do is to suspend the lamp directly over the work in progress, and about seven (7) feet from the floor. Suppose, for instance, you are working at a vise with bench against the wall. You can have a flexible arm fastened to the wall, so as to swing out over the vise. Have a shallow cup on arm to set the lamp in. When not in use this can be swung back out of the way, but it makes no difference what kind of a contrivance you rig; all you want is that a a bright light with shade to throw the light down is suspended above the work, high enough to be out of reach of hammer or other tools while being used. You will find this to work first rate. The light does not dazzle you and it shines just where you want it. We are using it on lathes, planers and other tools as well as at vises, and it gives




A Grindstone Mount.

good satisfaction. The cost from breakage of chimneys is quite small, much less than one would suppose.

## Grindstone Mount.

From a recent issue of the *English Mechanic*, we reproduce a sketch of a peculiar grindstone mounting, and the correspondent's letter accompanying the same:

The accompanying sketch, such as it is, is intended to represent a ten-inch grindstone, which I have recently mounted, and in so doing have followed out an original idea.

Little or no explanation I think is needed, except that the pipe *a*, is for the purpose of drawing off the water from the zinc trough, the top edges of which latter are bent down over the wooden trough at *b*.

The object is to obviate the mess and slop, usually the result of a grinding bout, and this, after a good trial it effectually attains;

New Tire Upsetter.

*c*, is a movable stop, adjusted as required by means of thumbscrews shown. It appears as mounted on a lathe bed.

It is well to add that the grindstone should be trued up well, and without notches or something might break by the catching of the tool.

## New Tire Upsetter.

The new tire upsetter illustrated on this page consists of a treadle, a spring, a jointed standard carrying toothed arms upon its upper end, the bar and keepers for holding the standard erect, and the concaved and toothed plate for preventing the tire from slipping.

The anvil-block is made in two parts, or has a slot or opening formed through it to receive a treadle.

The treadle is held up by a coiled spring, attached to it and to the base of the anvil, or the upper part of the block. The rear end of the treadle pivoted to the rear side of the block, and to it, near its rear end, is pivoted the lower end of the standard, which passes up through a strap, attached to the rear side of the block to keep it in an erect position.

The standard is jointed so that its upper part can be turned back out of the way when not required for use.

The standard is held erect when in use, by a bar placed upon its rear side and inserted in keepers attached to the standard above and below its joint, so that the bar can be readily withdrawn to allow the standard to be turned back out of the way.

Upon the upper end of the standard are formed two forwardly-projecting arms, which extend over the anvil and have teeth or points upon their lower sides to take hold of the tire and hold it while being upset.

Upon the top of the anvil is laid a plate, which has a square projection, formed upon its lower side at one end to fit into a hole in the anvil to keep the plate in place.

The middle part of the face of the plate is concave to give the proper shape to the upset part of the tire.

The end parts of the face of the plate have inwardly-projecting teeth formed upon them to take hold of the tire and hold it from slipping while being upset.

In using the upsetter the tire is heated and has an inwardly-projecting bend or loop formed in it over the horn of the anvil. The looped part of the tire is then placed between the arms, the tire upon both sides of the loop is clamped between the arms and the plate, and the loop in the tire is hammered out, shortening the tire more or less, according as a greater or less loop may have been formed in it.

John F. McCoy, of Beverly, N. J., is the proprietor.

## Wilder's Volumetric Regulator.

The regulator illustrated herewith, for gas fluids and a variety of applications, consists of a cylindrical metal cup and float fitted in the gas pipe, at any suitable point where the gas must pass through the regulator on its way to the burner.

The float fits loosely in the cup, and is lifted and held poised in the current of gas as it flows. There are holes (*o o*) in the float of a size to pass the required volume of gas at a pressure which will sustain the float. If the gas in the supply pipe has a pressure greater than will sustain the float, the float rises and covers so much of the gas ways (*g g*) as represents the excess of pressure; it operates automatically, therefore, to maintain a flow of gas through the holes (*o o*) and gas ways (*g g*), which will sustain it and hold it poised in the current.

The flow of gas in a given time is dependent upon the size of holes (*o o*) and the weight of the float. These factors being constant, the delivery of gas will be constant also.

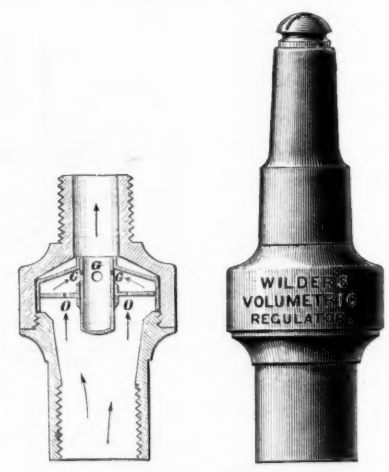
It operates alike to maintain a constant delivery with burners of every kind, and by giving to each burner the volume of gas it was made to consume, it is claimed that it secures and maintains perfect combustion and economy in the use of gas.

It is made of metal and is readily accessible for cleaning.

Wilder's Volumetric Regulator is manufactured by the New York Gas Controlling Co., 55 Boerum Place, Brooklyn, N. Y. They are made of several different capacities, there being no virtual limit to size.

The Mexican Government has granted a concession to the Mexican Central Railroad Company, which has been taken by the Atchison, Topeka and Santa Fe, and Chicago, Burlington and Quincy Railroads, and by American and foreign bankers. The concession gives them the right to extend their line already projected from the City of Mexico to Leon northward to El Paso Del Norte on the Rio Grande frontier of New Mexico, where connection will be made with the Southern Pacific of California, and other roads. A subsidy of $15,200 per mile is granted. The second concession has been granted to the Mexican Railway Construction Company, represented by the president of the Denver and Rio Grande Railroad. It gives the right to build a narrow gauge road from the City of Mexico westward to Mauzavilla on the Pacific coast. Also northward to the Texas frontier, where connections will be made. A subsidy of $7,000 a kilometer for the Pacific line, and $6,500 for the Texas line is granted. In the concessions to both companies the Government agrees that it will not grant subsidies to any other lines within a belt of territory 65 miles wide on each side of the proposed lines.

A mixture of sulphur and grease has been in use for some time as a lubricant for the bearings of heavy shafting. Sulphur alone, as is well known, has the effect, when properly introduced, of cooling a hot bearing. But why sulphur should so act has not been well understood. Von Heeren offers this explanation: Fine metallic dust is formed when a journal becomes hot, and this dust, combining with the sulphur, produces a soft, greasy compound of a decidedly anti-frictionless character.




Wilder's Gas Regulator.

Articles of incorporation have been filed by the Burlington, Peoria & Toledo Railroad Co. The new corporation is to have a capital stock of $12,000,000; and it is organized for the purpose of building a railroad from Peoria, Ill., to Toledo, O. The office of the road will be at Chicago.

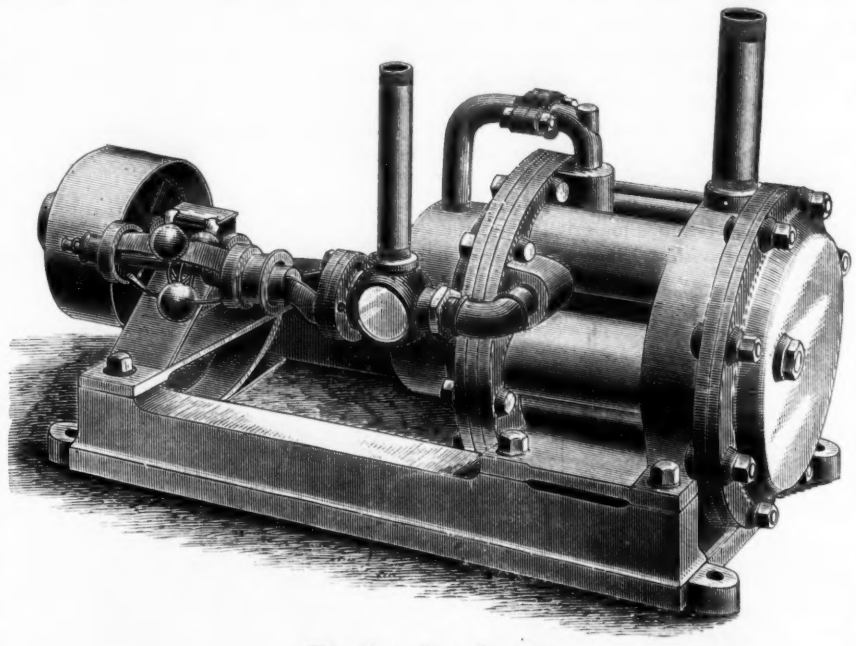
The railway supension bridge below Niagara Falls, says the *Toronto National*, has recently been transformed from a wooden to an iron and steel structure. Piece by piece the immense beams, the ponderous sleepers and other huge timbers have been removed, and their places supplied with iron and steel. And while all this has been going on systematically the use of the bridge has not for a moment been suspended. The old suspension bridge is now probably one of the strongest bridges in the world.

The last issue of the *Railroad Gazette* has information of the completion of 3,607 miles of new railroad thus far this year, against 2,214 miles reported at the same time in 1879, 1,267 miles in 1878, 1,396 miles in 1877, 1,677 miles in 1876, 804 miles in 1875, 1,101 miles in 1874, 2,778 miles in 1873, and 4,970 miles in 1872.

Several water-works companies have asked Alantic City, N. J., council for the passage of an ordinance giving it the privilege of supplying the city with an abundant quantity of pure and wholesome water. The ordinance is now pending.

## The Colt Disc Engine.

The engravings on this page and the one opposite represent the Colt Disc Engine (West's patent), made by the Colt's Patent Fire Arms Manufacturing Company, Hartford, Conn. The engine, as now constructed, is the result of some years of careful study and experiment, which have served to demonstrate the practicability and economy of the motor. A short cut-off can be obtained and the steam be expanded greatly in the cylinders. Every part of the engine is so arranged as to offer as little frictional resistance as possible, and to secure extensive bearing surfaces in order to obtain economy of steam and great durability. The engine occupies but little space, and is therefore very portable. All the principal working parts are enclosed in a case and surrounded with steam, which keeps them thoroughly lubricated with oil, which is mixed with the steam by a single oiling apparatus connected with the steam pipe. Its construction is such as to exclude dust and dirt, and, as it can be taken to pieces in a few minutes, the working parts are readily accessible. All working parts are self-inclosed in one casting, and the engine will therefore work as well out of doors as under cover. As high speed and uniform action are distinguishing features of this engine, it is well adapted to driving fans, blowers and centrifugal machinery, and for other classes of work where these qualities are desirable. It requires no skilled attendance, and enables the power to be applied directly to the work without the usual intervention of belts and gearing.



The Colt Disc Engine.

We present cuts of a disc engine for power and one for marine purposes. For yachts it presents the advantages of occupying small space, extreme lightness, high speed, uniform motion, and a device for reversing at full speed.

The main body of the engine consists of one casting, containing six cylinders, arranged in a circle, and parallel with one another like the chambers of a revolver. Fig. 1 is a longitudinal section of the engine. The pistons *A*, take the form of a hollow plunger, one end terminating in a blunt cone, which bears continuously against the periphery of the disc *B*. They are single acting, being subject to steam pressure upon the flat end only. Steam is admitted successively to the six cylinders from the steam chest *C*, three pistons being constantly in action at different points of the stroke, thereby imparting a uniform rolling motion to the conical disc *B*, which is steadied at its center by the ball and socket joint *D*, and rolls upon the conical surface of the back plate *E*, which receives the full thrust of the pistons, and protects the ball and socket joint, *D*, from strain. The crank pin *F*, is securely fixed in the center of the conical disc *B*, the rolling motion of the disc causing the pin to describe a circle, and by means of the crank *G*, imparting a rotary motion to the shaft *H*. The shaft *H*, passes through the center of the steam chest, and carries an eccentric *I*, (Fig. 2), giving motion to the circular valve *K*, the action of which is more clearly defined in Fig. 2 (page 3). In this figure the ports are seen in a circle, being merely openings in the plate of metal forming the end of the cylinders. The valve *K*, is a flat circular ring which slides steam tight, but perfectly free between the port face and a balance plate, which prevents the steam pressure from acting on the valve and makes its movements nearly frictionless. The steam is admitted to and fills the annular space *C*, left in the steam chest outside the circumference of the valve ring *K*, the eccentric motion of which alternately opens and closes all the steam ports, successively admitting steam to the cylinders, from which it again escapes to the exhaust chamber *M*, formed by the inside of the valve ring, and thence through openings into the body of the engine, and is finally discharged by the exhaust pipe *N*.

All the working parts are lubricated by the steam, which is charged with oil from a lubricator connected with the steam pipe. The engine is usually constructed to cut off steam at half stroke, but, when desired, the cut-off can be altered to any point, from one-tenth to full stroke. Certain modifications in the details of construction are also made to suit special requirements.

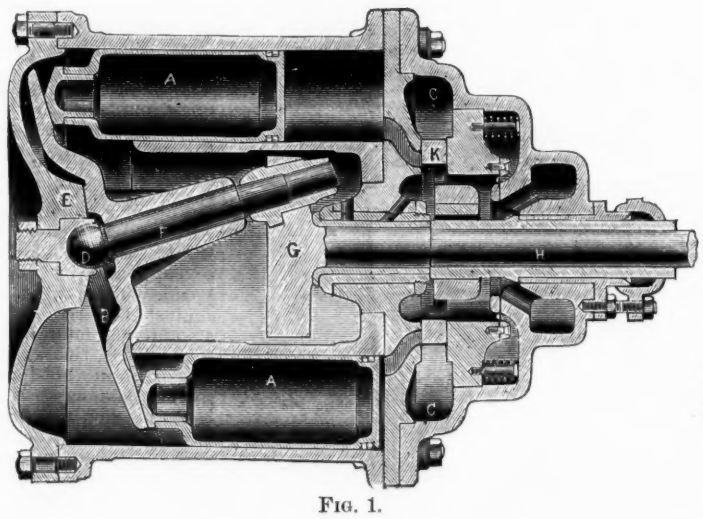
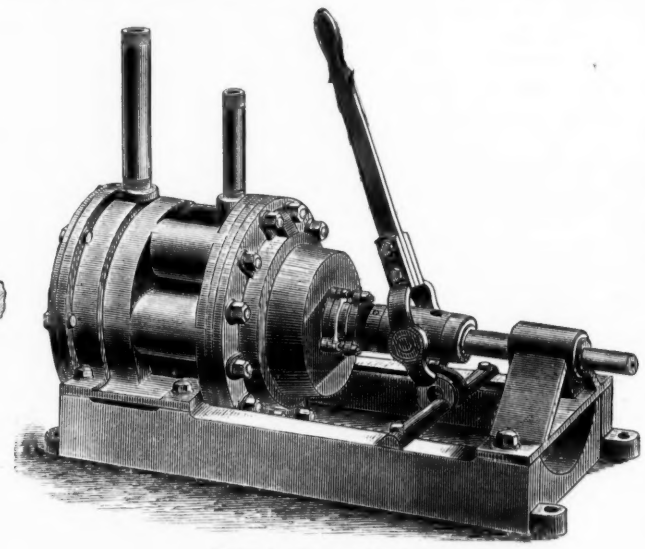



Fig. 1.



Disc Launch Engine.

Fig. 3 is a view of the interior of the engine, with the back cover taken off and the disc and pistons removed, showing the positions of the steam ports and exhaust passages, the exhaust pipe, and the crank *G*. These disc engines have been used largely in Europe with excellent success.

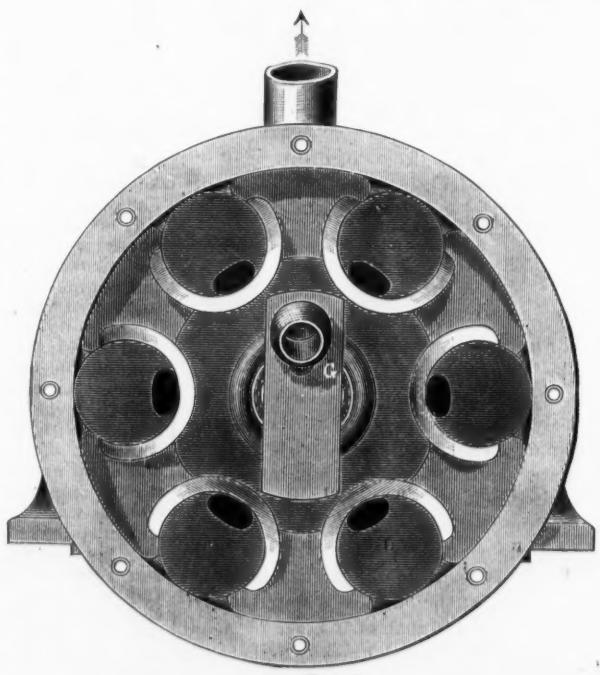



Fig. 2.

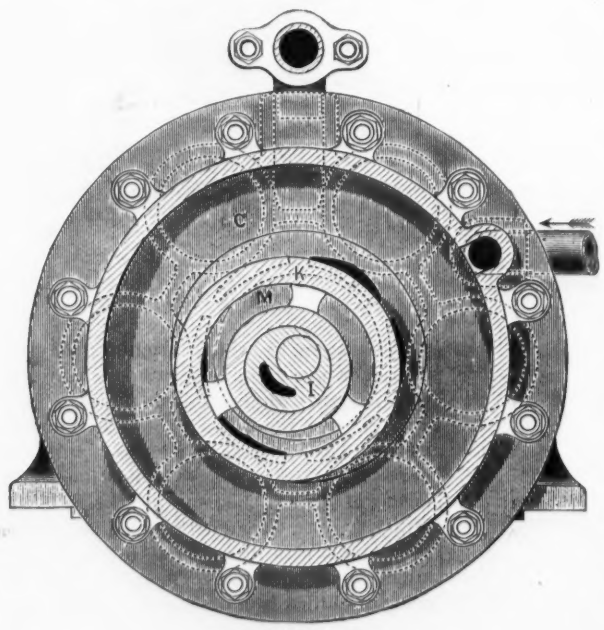



Fig. 3.

## Results of English Free Trade.

The following extract from the leading British iron trade journal, *The Ironmonger*, shows very clearly one of the beneficent results of English free trade upon the laboring classes. Yet there are those who are anxious to have the same system adopted in this country:

It is in all probability a matter for general congratulation that the proposed strike throughout the wrought-nail trade of the Black country has not taken place. We say "in all probability" because this particular industry stands alone in its peculiarities, and is, unfortunately, distinct from the other principal trades of this country. Under ordinary circumstances a strike of workmen is a most deplorable matter, and one which every right-minded person must view with regret. The wrought nailers, however, are in the most miserable and unenviable of positions. They are poor—having been so time out of mind—and have at all times a desperate struggle to keep the wolf from the door. They are ground between the millstones of relentless middlemen and their own bodily wants, and are apparently always on the very verge of destitution. These nailers—men, women, and children—are with rare exceptions the victims of the "foggers," who deal them out small quantities of iron and buy back the nails made therefrom on their own terms. Such a plan is closely related to the truck system, and is, therefore, a disgrace to those concerned and the country generally. The 30,000 nailers who were expected to strike on Monday last, but abandoned the idea at the last moment, are certainly better at work than idle, yet we cannot avoid expressing the opinion that they have really serious grievances, and that they carry on their operations under conditions which deserve and demand early reform. Their continued existence, as a class, may be problematical, but so long as they do exist they are surely entitled to the ordinary amenities of common humanity.

Polishing Watch Wheels.—To excel in this art requires a good deal of watchfulness and practice. The wheel to be polished should be smoothed by slate-pencil and oil, either in the turns or upon a flat piece of good cork, after which it must be made quite clean by means of kneaded soft bread; then, having a block-tin polisher with a smooth and polished face, produced by a clean burnisher, and supplied by a thin layer of very fine "red stuff," dabbed on by means of a clean finger-end, the wheel placed upon a cleanly-cut cork secured in the vise, may be glossed with the previously prepared tin polisher. It must be remembered that cleanliness is one of the chief points for success. It may be added that, as gloss approaches, the pressure of the polisher upon the wheel must be gradually reduced, until the weight of it, if possible, is the only pressure.—*Seconds' Practical Watchmaker.*

In a recent paper, read before the British Association, on the subject of Lightning Conductors, Mr. W. H. Preece reached the conclusion that "extent of surface does not favor lightning discharges," and that "no more efficient conductor than a cylindrical rod or a wire rope can therefore be devised." This conclusion will doubtless agree with results everywhere.

## Improved Mining Machinery.

The engravings herewith shown represent some improved appliances for mining purposes, as manufactured by Beckett & McDowell, office, 17 Cortlandt St., New York. In extensive mining localities, it has been found necessary to adopt the most improved machinery, as the original facilities have proved themselves to be entirely inadequate for operating large mines. In raising ore and other substances, from a depth of over 800 feet, experience has demonstrated that a round rope is not the best medium for hoisting, and in view of existing difficulties its use has been almost entirely abandoned.

When the attempt is made to operate a single rope at a greater depth than referred to, and the rope is allowed to wind upon itself, the result has been that it has been rapidly destroyed by chafing. To overcome this has necessitated the adoption of larger drums having wider faces with spiral grooves in them, to accommodate coils of rope containing from 1000 to 4000 feet. In winding upon a drum of small diameter, the strains upon the individual strands are so great that they soon give way.

To obviate this a larger drum must be employed. In passing from the overhead sheaves down the shaft, each rope must occupy a central position in its own compartment. This allows no lateral motion to the sheave, and continually forces the rope to leave its position and wind upon the drum at an angle, The instant the middle of the drum is passed a tendency on the part of the rope is created to leave its groove and climb the incline that separates the respective layers, thus chafing and wearing rapidly away.

To remove these difficulties the drum is generally placed a considerable distance from the shaft, which decreases the angle referred to, but new complications arise caused by the swaying of the rope between the sheave and drum. This introduces irregular strains, which prevent the engineer from landing the cages or giraffes with the accuracy necessary for rapid working.

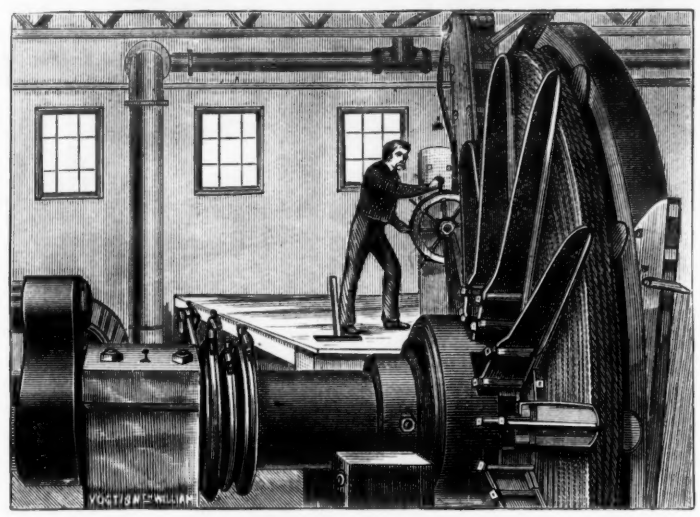
In districts where the surface of the country is very much broken, where only a limited space for machinery can be reserved about the shaft, a serious objection to round rope machinery arises on account of its size. The engraving represents a recently perfected plan of using a flat rope. The flat rope in this case is composed of five single ropes, which wind upon a drum. It will be observed that the engine exerts the greatest power in starting the load, and as the rope is wound upon the drum the speed must necessarily increase.

The flat rope is more readily removed from the drum for cleaning and repairing than the round rope. The hoisting engine shown in the engraving was designed for general hoisting purposes and being a double reversible engine, is adapted to any class of work where a hoisting engine is required. These engines are arranged with Frisbie's friction clutch, by the adoption of which all the power is transmitted to the rope, instead of being partly consumed by friction in side thrust upon the journals as with the ordinary clutch. These engines are made with single and double-drum hoists, also with and without clutch. The sizes range from $5 \times 7\frac{1}{2}$ in. up to $8 \times 12$ in.

The crusher shown on the opposite page was designed for crushing ore and other mineral substances. One of the principal features of this crusher is fewness of parts. It reduces ore to an even size. It has no springs, hook rods, or other devices liable to get out of order. It has no cranks or toggles, the motion to the jaw being imparted by an eccentric, forged on and turned with the main shaft. It has no wedges, the gauge being regulated by substantial packing blocks which can be changed at a moment's notice. The shoes and dies are of wrought iron, which, after a long trial, has been found to be the best material for this purpose, thereby avoiding the annoyance of breakages so frequent with shoes and dies of other material. They have been found to wear better than steel or chilled iron, and are made reversible, so that benefit of both surfaces is obtained. Having so few working parts, and those few being of great strength, its liability to breakage and wearing is greatly reduced, so much so that the life of the machine is greatly prolonged.

A comparison of prices with work done will prove that with all its superior advantages it is a very economical crusher. The weight being reduced to a minimum, the cost of transportation is materially lessened. It is furnished with a balance wheel, also fast and loose pulleys, ready to receive the belt.

The Cornish rolls represented by the engraving are of an improved design, and are used for reducing ore and other mineral substances after they have passed through the crusher. These, for simplicity, strength and durability secured in their construction, should be entitled to the favorable consideration of those requiring this style of machinery.



FLAT ROPE HOIST.

The strains to which machines of this character are commonly subjected are, in this design, wholly taken up by strong wrought iron bars. These hold the journals of the rolls together, doing away with the necessity of extra heavy foundations. By means of large rubber springs the risks of injury to rolls, through the accidental passage of tools with the materials to be crushed, are largely eliminated. The rolls proper are made of chilled iron or steel, as desired, and when worn, can be replaced at a nominal cost.

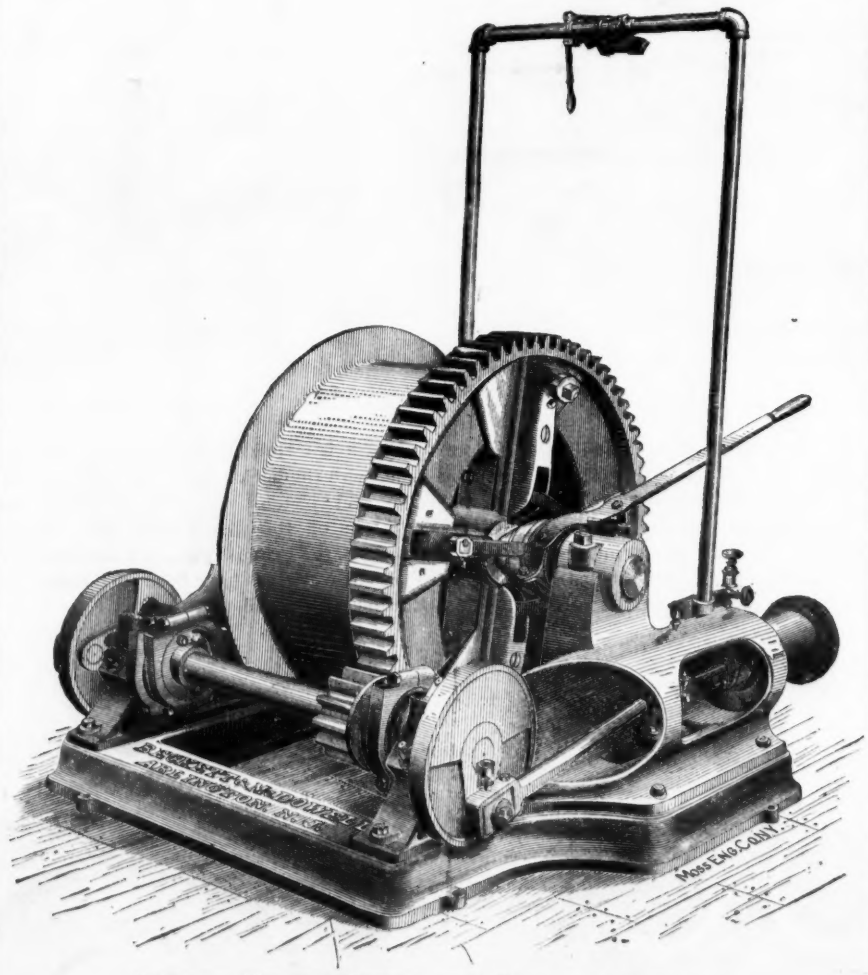
These machines in operation are said to give entire satisfaction.

A No. 3 machine, with rolls of a 30-in. diameter and a 16-in. face is said to crush from six to eight tons per hour.

The works of Beckett & McDowell are at Arlington, N. J.

## Compressing Fluid Steel.

A proposal has been lately made in some quarters to effect the compression of fluid steel by placing in the ingot mould, on the top of the fluid metal, a charge of nitrate of soda or other solid which evolves gas on being heated, the top of the ingot mould being then closed, and the pressure due to the gas generated, being allowed to act on the fluid steel. With reference to this proposal it may be worth while to record that this mode of operating was proposed—and we believe patented—by M. Antoine Galy-Cazalet, of Paris, some thirteen years ago. M. Galy-Cazalet proposed to use a mixture of 80 parts of nitrate of soda with 20 parts of charcoal, the mixture being introduced through a cock fitted to a cap affixed to the head of the ingot mould. With a space of 30 cubic inches capacity between the fluid metal and the ingot mould cap, the introduction of $\frac{1}{4}$ oz. of the mixture is stated to give a pressure equal to that of a head of metal 90 ft. high. We do not know whether this mode of operating was ever regularly applied in practice; but if it was, it would be interesting to know the results.—*Engineering.*



IMPROVED HOISTING ENGINE, WITH FRICTION ATTACHMENT.

## Four and Six-Wheeled Trucks.

The *National Car-Builder* says:

Although there is a general tendency to increase the weight of engines and cars on our roads, there is at the same time a growing belief that the use of six-wheel trucks, even under the heaviest passenger coaches, is not by any means essential for safety or easy riding, and still less so on the score of economy, and that they may, and eventually will be, superseded by four-wheel trucks altogether. It is readily admitted that the former possess some advantages over the ordinary four-wheel trucks; it is also urged that these advantages have been very much diminished with improved road beds and steel rails, so much so in fact as to be but a meager compensation for the extra material and weight hauled, and the additional friction in running as well as cost of construction. This being the case, it is a pertinent question whether the actual comparative advantages of six-wheel trucks may not be fully secured by some slight modification of the present standard styles of four-wheel trucks, giving them a somewhat longer wheel base, and strengthening the journals and other parts in proportion to the increase of weight to be carried. The usual distance from center to center of journals in the ordinary four-wheel trucks is 6 feet. Let this be increased to 7 feet, and let the journals, instead of being $3\frac{1}{2}$ by 7 in., be increased to 4 by 8 in. Let the timbers of the frame, and also the equalizing bars, be strengthened somewhat, a wider bolster introduced, and four instead of three-group elliptics; or, in a word, increase the capacity of the four-wheel truck so as to make it do the same work as the six-wheel one, and do it equally well and with as great a margin of safety. The reduction of the number of bearing points from six to four, and the corresponding concentration of weight, is fully provided for by an increase in the diameter and length of journals, whether it be 4 by 8, as above indicated, or some other approximate size. The larger the journals the more bearing surface there is, and less liability to heat: and as for strength, there can hardly be a question about that.

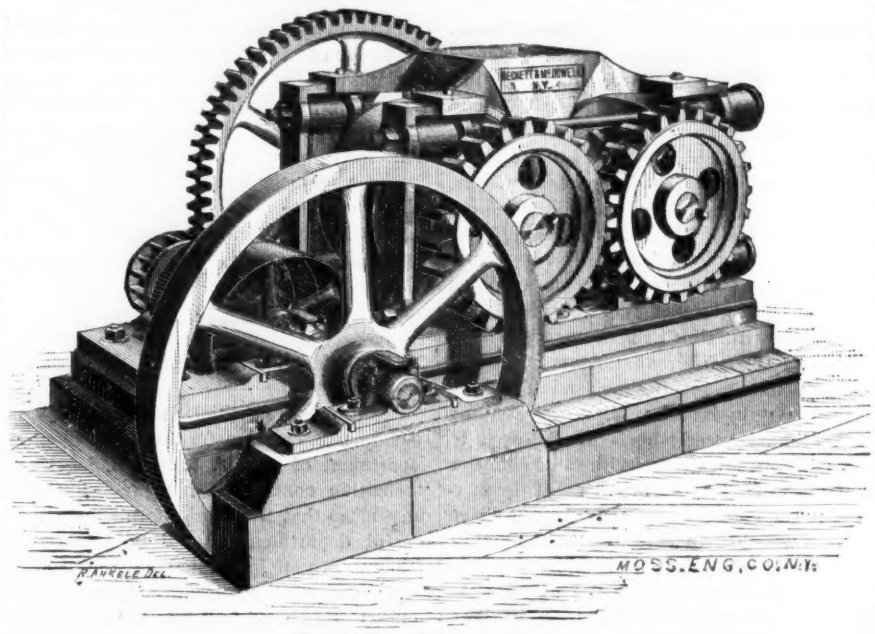
It is believed that four-wheel trucks modified in this way would carry the heaviest sleeping and drawing-room coaches as easily as the ponderous six-wheel trucks do, and more economically, especially upon lines with moderate curvatures. The wheel base would, it is true, be reduced from nine to seven feet, or in same cases from eight to seven, which is a small matter when weighed against the reduced complication and the amount of material that is got rid of—say, four wheels, two axles, two pedestals, two oil boxes, one bolster with its sand plank, springs and hangers, a lot of bridge work, and other minor details. If it can be shown that the getting rid of all this material and weight lessens, in the same proportion, the safe and easy running of heavy cars, it would be conclusive evidence in favor of retaining in service six-wheel trucks. But this, with a properly constructed four-wheel truck, with the advantages of steel rails, improved rail joints and better road beds, will hardly be attempted. The permanent way of all our leading lines is constantly being bettered and brought more nearly to the standard of English roads, and the more this is done the less will be the real or apparent advantages of that extraordinary system of running gear which places 500 pound wheels and six axles under a single car in order to make it run easily—to say nothing of twelve 42-inch wheels weighing from 700 to 800 pounds each, which are now running under some cars, and which is something more extraordinary still.

A well known car-builder was several years ago called upon to take charge of the car stock of a Western road of which the late Governor Brough, of Ohio, was president. The passenger cars of the road were all running on six-wheel trucks, which were considered as much better than four wheels, as the greater number is superior to the lesser. The engines were light, and could not by any coaxing or vigorous firing be made to meet the pressing demand by the patrons of the road for greater speed. There was an unaccountable drag in the movements of the trains. A consultation of the officers was held to devise a remedy. The fault appeared to be with the engines, but the company could not afford to replace them with new and more expensive ones. An idea struck the car superintendent, which was that the trouble was all with the six-wheel trucks, and in spite of the reluctance of the officials to believe such a thing, he built some four-wheel trucks with a seven foot wheel base, and, with these under the cars, the engines were able to make the required speed without any difficulty, in consequence of the diminished weight and friction resulting therefrom.

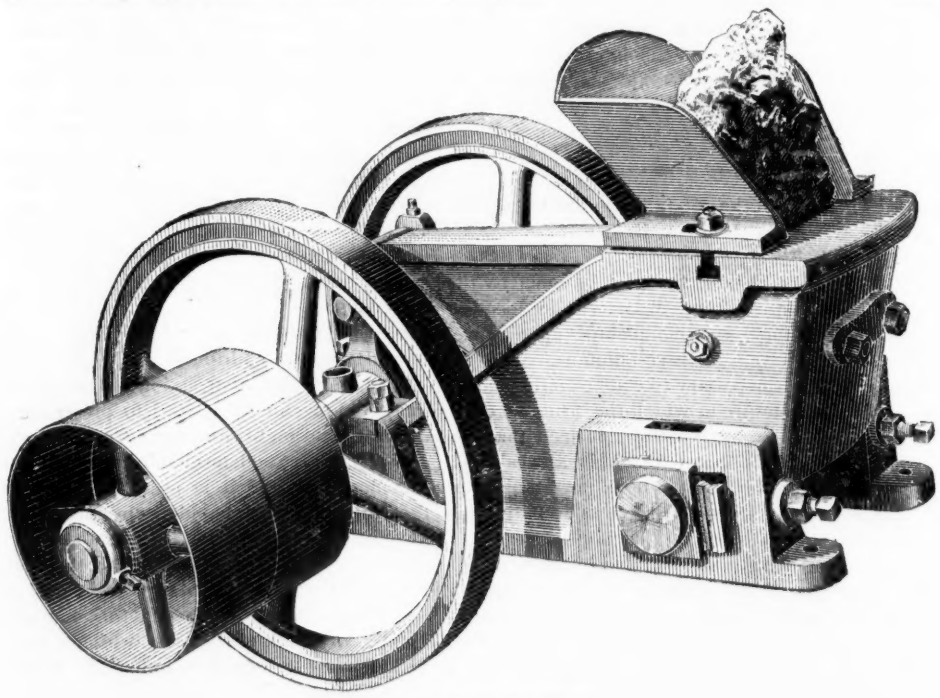
The Greencastle, Eel River and Vincennes Railroad Company has been organized to build a railroad from Greencastle, Ind., the crossing of the Terra Haute and Indianapolis, the Indianapolis and St. Louis, and the Louisville, New Albany and Chicago roads, southwest through Putnam, Clay, Owen, Green, Sullivan and Knox counties to Vincennes. The capital stock is fixed at $1,000,000. The distance is 85 miles.

The Buffalo, Pittsburgh and Western Railroad Company has filed articles of incorporation to build a railroad from Buffalo, N. Y., to a point on the Pittsburgh, Titusville and Buffalo road in Portland, Chautauqua county, a distance of 51 miles. The capital stock is $1,000,000, and the incorporators are H. A. V. Post, C. C. Pomeroy and others.

RAILROAD LABEL CLIP.—We notice that Messrs. Cocker Brothers, of Sheffield, have recently introduced an ingenious and useful little device for fixing labels, consignment notes, &c , on the sides of railway trucks. It consists of a steel wire bent so as to form three sides of a square, the wire on the fourth side being coiled to form springs, while the ends are sharpened so that they may be driven into the side of the truck. A sharp projection is made on each of the vertical sides of the frame thus formed, in order to hold the ticket securely when it has been placed in position by pulling the clip forward, which in its normal position is kept by the springs tight against the side of the wagon. This arrangement is the best of the kind we have seen, as the label which is held quite fast, can be put in place or removed, without any trouble or loss of time. Besides its special application for railway wagons, it is also well adapted for use in offices, works, &c., for wall clips.—*Engineering.*



IMPROVED CORNISH ROLLS.



IMPROVED ORE CRUSHER.

The Postmaster-General decides that cards may be sent for one cent through the mails until the first of January next, when only United States postal cards will be forwarded at that rate. The limit has been extended to the above date so that the new rule may become generally known in the meantime.

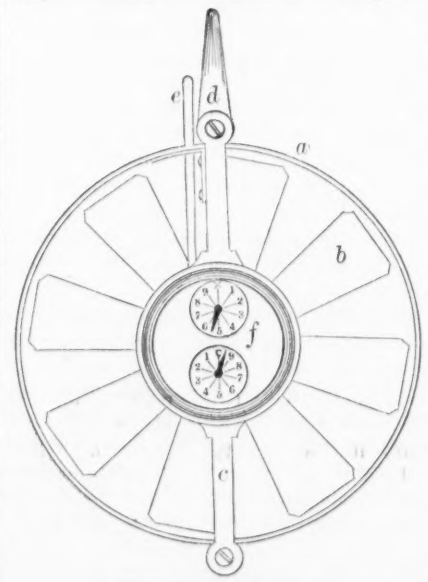
A writer in the *English Mechanic* says:

I, for one, believe that the time will come when newspapers and books will be largely printed from india rubber stereotypes. They can be easily and rapidly made, and I have cured rubber very successfully in the usual paper or "flong" moulds, faced with tin or lead foil, this latter being laid first on the type. The steam press might be employed for curing a rubber stereotype much larger than anything yet attempted in metal: and by employing a suitable rubber composition, it is not unlikely that a thorough curing might be effected in as short a time as ten or fifteen minutes. The power required to drive printing machines, working with rubber stereotypes, would be comparatively small, while impressions quite as sharp as those from metal ought to be secured. One advantage of the rubber stereotypes would be the ease with which they can be adapted to cylinders of any curvature. As regards ink for stereotypes, a few words may be said. A fatty ink naturally injures the rubber—at any rate, if it is not carefully removed after use—but an ink having glycerine as a basis answers extremely well, and may, as the specimens on the table prove, be left in contact with the stamps without in any way injuring them.

## Anemometer or Air Meter.

BY L. F. LYNE, M. E.

In measuring wind or air moving at high velocities, it becomes exceedingly difficult, without experiment, to obtain an instrument which is strong enough to bear the rough treatment to which it is subjected when exposed to the force of a high wind, or to the blast orifice of a fan or positive blower. The accompanying engraving represents an anemometer, which is imported by James Prentice, 164 Broadway, New York. This instrument, while possessing the required strength to stand rough treatment without impairing the action of its delicate parts, is not clumsy, or the weight of the fan sufficient to destroy the sensitive action required of such an instrument. Referring to the illustration, *a* represents a strong brass band or case, having two bars *c*, extending across the center. The enclosed dials *f*, are attached to one of these bars, while the opposite bar furnishes a support for the spindle or bearing of the fan *b*. The arms of this fan are made of steel, which renders them light and strong. The moving parts are made with the utmost precision, so that the slightest breeze will cause the instrument to act. The loop handle *d*, is for convenience in suspending or carrying the instrument. The upper dial records the number of feet up to ten, while the lower one records up to one hundred. In measuring the velocity of wind, the face opposite the dial is presented squarely to the wind, and the position of the pointers upon the dials noted. At the proper time, indicated by a watch, the lever *e*, is moved, which sets the pointers in motion, and when a sufficient observation has been taken, the lever *e*, is replaced in its former position, instantly stopping the pointers. A second reading is now taken, which will readily give the velocity of the wind. These instruments are made with a greater number of dials for long observations and also for the most delicate work, but would not do for rough practice. The writer used one of these instruments not long since during some locomotive experiments, during which time very interesting observations were taken. On one occasion the train was running against a head wind, which was blowing at a velocity of twenty miles per hour, and taking the velocity of the train, which was fifty-five miles per hour, gives a total velocity of seventy-five miles per hour. The operation of the instrument was, in every way, satisfactory, and is well calculated for the most severe tests. This instrument is also useful for ventilating purposes and ascertaining the draught in chimneys. This instrument is placed in a neat box, which makes it very portable.




THE ANEMOMETER.

NEW EXPANSION BIT.

## A New Expansion Bit.

One of our engravings on this page represents a new expansion bit called the "Derby," which is now being placed in the market by Felix Chillingworth, of New Haven, Conn.

The peculiarity of this new wood-boring tool is that the cutter, like the blade of a jack knife, when not in use, is enclosed within a deep recess milled in the body of the bit, and is thus protected from coming in contact with other tools and getting dulled or broken. This, as will be noticed, is a great advantage, for heretofore the cutters of extension bits have always been made to stand out at right angles with the shank, therefore offering a standing invitation to be rapped and injured.

Carpenters always have more or less difficulty when using the ordinary extension bit, to prevent the cutters from slipping or creeping. In the new Derby bit, this trouble is obviated by knurling that part of the cutter which remains within the body of the bit beyond the graduation marks (shown in the cut), so that its file-like roughness, when screwed to its bearing, fully prevents it from moving from the position in which it may be set.

On account of the unusual strength of the cutter, and the ease with which it does its work, this bit is well adapted to use in the common brace, and in both hand and steam-boring machines. With one cutter it bores from ¾ths to 2 inches, while heretofore it has required two cutters in an expansion bit to bore an inch and a half hole. The tool appears to be strong, durable, not complicated or liable to get out of order.

A French scientist recommends the use of glycerine to prevent the formation of scale in boilers, in the proportion of one pound of glycerine to every 300 or 400 pounds of coal burned. This may work well in certain kinds of water but we question its value as a universal specific for boiler scale.

The annual meeting of the United States Association of Charcoal Iron Workers will be held at Harrisburg, Pa., commencing Tuesday evening, October 19th, and continuing through the 20th, 21st and 22d.

A freight engine on the Rome, Watertown and Ogdensburg railroad exploded at Canton yesterday. The fireman was slightly injured. No one else was hurt. Heavy pieces of iron were thrown one hundred rods. The fields were strewn with fragments of the engine.—*Syracuse Evening Herald, Oct.* 1.

Minnesota claims that 40,000,000 bushels of wheat is the lowest aggregate at which the State's yield of this year can be placed.

A company has been formed for the manufacture of paper and paper stock in this city. A capital of $50,000 has been secured, and if desirable will be increased.—*Oswego Times.*

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☞ *We are not engaged in procuring patent rights, or in selling machinery; nor have we any pet scheme to advance, or hobby to ride.*

☞ *We invite correspondence from practical machinists, engineers, inventors, draughtsmen, and all those specially interested in the occupations we represent, on subjects pertaining to machinery.*

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NEW YORK, OCTOBER 23, 1880.

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## Peculiarities of the Emery Wheel Trade.

One of the most peculiar mechanical industries in this country is the manufacture and sale of solid emery wheels. Viewed from an inexperienced standpoint there is nothing difficult or expensive in making emery wheels, yet there has been more disappointment and loss of time and money in unsuccessful ventures in this industry than almost any other of a mechanical type, employing an equal amount of capital and labor. Wheels can be made by mixing ground emery with a wide variety of different substances, and afterwards moulding into shape and subjecting to a heavy hydraulic pressure, or baking in a kiln. Pressed wheels are allowed to dry out for a few weeks; with some cohesive material as long as six months. If the mixture is such as to insure a strong and sharp cutting wheel (with careful attention while making) the next most desirable quality to obtain is uniformity. It is one of the most difficult parts of the business to secure and preserve uniformity in the different grades of wheels. Wheels made at one time may come out with as even and regular cutting and wearing qualities as could be desired; those made according to the same formula, and by the same workmen a few days afterwards, may be so irregular in wear as to make it necessary to condemn them entirely.

One of the most vexatious things for an emery wheel manufacturer is never to be able to exactly duplicate the sample lot ordered by a customer, who has made a specimen order, commended the wheels in the highest terms, and ordered more of the same kind. Yet just such vexations are often caused, especially to those manufacturers of solid wheels who have not had long experience and thorough discipline through failures. Some pressed wheels and, occasionally, wheels that are moulded and dried without pressure are badly affected by moisture, even when kept in as dry a place as circumstances will permit. Effects of changes in the atmosphere are exhibited in such wheels so as to seriously interfere with their ordinary working qualities.

We know of parties using emery wheels, which are so susceptible to moisture that all those not mounted and running are kept lying over a hot steam boiler for the purpose of drying them out thoroughly. With baked emery wheels, uniformity is most difficult to obtain. The same mixture is likely to produce wheels of various consistencies. Some may be much softer on one side than on the other. The conscientious manufacturer of kiln-baked emery wheels will lose more wheels by accident than he will save in proper condition. Yet it is hard to tell the wheels that are not uniform until they are tried in actual work.

Some emery wheels that seem to possess no other fault, will gum or glaze, thus causing great annoyance. In a few instances, this trouble is caused by improper management, but more frequently by the cohesive material with which the wheels are compounded. Emery wheels are occasionally condemned because they wear away rapidly while doing good work. This, unless the wheel is very high priced, is a good quality.

Although the difficulties in the way of manufacturing good emery wheels are many and complex, still greater obstacles are interposed in the way of selling them and collecting the money. About every manufacturer of wheels has active agents soliciting trade, and the pressure is so strong to persuade consumers to try different wheels that extra inducements are held forth for first orders. In this way emery wheels are sometimes sold on one, three or even six months' trial. Even with an understanding that the wheels must be paid for, if used, long credits are offered to secure orders.

This plan is necessarily attended with heavy expense. As we were once informed by a leading emery wheel manufacturer, it costs more to sell the wheels and make collections than to produce them ready for use. Inquiry has convinced us that, with the assurance of a steady cash trade, the best emery wheels can be made and sold at about one-quarter of the present prices. If a reform in methods of selling could be carried out to the extent of requiring purchasers to buy and pay for emery wheels the same as grindstones, machine tools, and raw material, they would be sold at a great reduction from prices now demanded. This, however, can be effected only by a determination on the part of purchasers to apply the same strict business principles in supplying themselves with emery wheels as with other commodities.

## Transferring the Signal Service.

The proposition which has been made in some quarters to transfer the meteorological department of the U. S. Signal Service to "scientific control," if it means anything, must mean that the work of this very successful department should be transferred either to private individuals or to the management of some scientific body or association. If this important and valuable work had been originated by private persons, or carried to its present remarkable degree of usefulness by some scientific body, a proposal to turn it over to governmental management might well be viewed with suspicion. No one, who knows anything of the results already accomplished, can doubt that this work has been, since its inception, under scientific control; and there is no reason to fear now that it will be confided to any but scientific hands under government management.

The proposal to relegate such an exceptionally successful modern improvement to the domain of private interest, or to the fitful and irresponsible management of scientific associations, is a proposal that only needs discussion to be condemned.

## Another of the Mistakes made by Smith, Jones & Brown.

In a recent issue the mistake made by the firm of Smith, Jones & Brown, in locating their factory, was commented upon somewhat at length in these columns.

It is not necessary to state exactly the line of manufacture in which the firm were engaged, as we have always noticed that too much precision of detail is a weakness. Rounding the corners of a narrative is as essential to speed and force as rounding the corners of a bullet or a cannon ball.

Shortly after the firm had begun to realize that the air of Brownsville was somehow not conducive to business prosperity, Smith's wife had a legacy left her, and the general discontent of the Smith family with their surroundings, together with the irritation which somehow sprang up among the partners as a result of the financial showing of the business, led to dissensions which eventually caused the withdrawal of Smith from the firm. Smith had always been the superintending partner in the mechanical department, and naturally enough Smith's representations of the difficulties of location, by which the operations of the firm were hampered, were met by strong suspicions on the part of the non-resident partner, Brown, that the real root of the difficulty was a general want of the managing faculty in Smith, rather than a heavy handicap in the matter of location facilities. So one rainy day Smith sold out his interest to his associates for considerably less than it had originally cost him, and went to England with a view to setting up a shop in England on the American plan, leaving Jones in charge of both the office in the city and the works in the country.

Naturally this method of procedure gave Jones all the work he could tie to. The prosperity which somehow declined to accept the firm's invitation, would have made the work of the office exceptionally difficult, had its aspirations been less lofty, but difficulty was a word at whose mention Jones had no notion of getting scared. As the competition grew more fierce, and profits correspondingly narrowed, Jones looked round, more earnestly than ever, for lines of goods to make on which competition was less to be feared. By this means so many new articles were added to the firm's price list, from time to time, that the simple sheet of a few years previous swelled visibly every season, and began to show really aldermanic proportions. The worst of this catalogue trouble was that each new branch of manufacture, however simple and tempting it appeared on first sight, involved so many sizes and corollaries and adjuncts, that were put into the catalogue from time to time, on the factory's promise that the patterns would all be ready before the catalogue got into the hands of purchasers (and curiously enough, these promises were almost invariably defeated by some unforeseen and unforeseeable accident), that the catalogue always represented a much larger line of goods than the firm had any hope of being able to furnish for months to come. Where the catalogue called for ten sizes, the firm could furnish three, could almost furnish two and a half, could half furnish two, and could furnish the remainder not at all, to the extreme disgust of the purchaser—tired with promises and fruitless waiting.

Naturally, this constipated condition of the factory caused extreme solicitude in the mind of Jones, the general manager. He gave up his pleasant home in the city, and instead of the frequent trips to the works that he had formerly made, set up a sort of bachelor club house at the works, hired a colored housekeeper and stable man, and varied the monotony of life in Brownsville by frequent trips to the office in the city.

The high repute which the firm gradually reached in the minds of the general public, by reason of the large line of goods displayed in their illustrated price list, Jones justly valued as one of the best assets of the firm, though not always, it must be confessed, a very available one. But in order to retain this prime factor in the prosperity that always seemed to hover just a year or two ahead, it became evident after a while, even to Jones, that more factory facilities and less catalogue were the needs of the hour. How to make goods quicker, better and cheaper was the problem to which Jones now seriously addressed himself.

Not unnaturally, labor-saving and otherwise improved machinery seemed to present the readiest solution of this conundrum. Now, Jones, while a good mechanic, was not an ingenious one, and it is possible that this fact might, under happier circumstances, have proved his salvation. But about a year after Jones took general charge of the business an estimable gentleman was engaged to assist Jones in the details of factory management; and this gentleman, while a very good mechanic, was also, unhappily, a very ingenious one. The latter had a quick eye for possible improvements, and these were of a kind so practical that they were usually adopted. As a result, the principle, as well as the details of most of the goods illustrated in the firm's catalogue, were altered. This frequently proved a great inconvenience, as many of the orders continued to come in from benighted districts for the goods described in the old catalogue, and the sizes and proportions of the improved goods would not fill the bill. Then, naturally enough, the firm's salesmen, hard pushed in their endeavor to secure orders and pay expenses, by the difficulties and delays which very often confronted them on their trips, in the shape of unfilled orders dating from the last trip, often found it expedient to score important advantages by exhibiting goods made according to the new and improved patterns. Of course, nearly every order thus taken left a quantity of old pattern goods on hand, and these became each day more and more unsalable. And so it went. The goods did not fit the catalogue and the catalogue did not fit the goods, while neither fitted the price list, which kept continually whittling down.

But about the worst mistake that Jones and his assistant subsequently had to reproach themselves with, was in the matter of providing improved tools with which to carry out this improved idea. Jones' assistant, look where he might, never found a tool to suit him. All the makers of tools for this

special industry seemed to work on the plan of the cravat maker, who made cravats for fifty years without trying any of them on, and only found out, when lying on his death bed, that the products of his establishment had lain unworn and unwearable on the shelves of dealers during all that time. A good many tools were bought, but nearly all of them were either altered by the maker, or altered and (let the truth come out!) really improved in Jones' shop by the ingenious methods invented by his assistant.

Thus, time and labor and attention that should have been directed to the improvement of the goods made by the firm, somehow seemed, for some two or three years together, to be spent in improving the products of tool-making shops. Of course, this cost a good deal of money, and the non-resident partner, Brown, had to be called upon to put up cash rather more frequently than was altogether agreeable to his sensitive pocket-book.

One day Brown paid a visit to the works, and on making a tour of the shops, rather incorrectly affirmed that he found more men engaged in tinkering tools than making goods, and the result was a quarrel and a catastrophe!

Cable dispatches from Melbourne, Australia, give information of the successful opening of the International Exhibition, October 1st, with appropriate ceremonies. Not all of the goods were in place, but the exhibition is represented as being very attractive and instructive. Our readers may expect some special correspondence from the exhibition during its progress.

Petroleum is the fourth of our export commodities, though the first artificial well was sunk only twenty-one years ago. The annual production is now some 15,000,000 barrels. A larger proportion of petroleum is sent abroad than of any other article except cotton, the export being about two-thirds of the total production.

## Literary Notes.

ANNUAL REPORT OF THE STATE ENGINEER AND SURVEYOR, on the Canals of the State of New York.

A copy of the above work, accompanied by voluminous original maps of the canal system lies upon our table. The State engineer and surveyor, Horatio Seymour, Jr., seems to manifest great enthusiasm in the maintenance and improvement of the water ways of the State. The subject of steam towage receives due attention, while facts and figures are given to prove its desirability. Our readers will remember that we published, some weeks ago, an article by Mr. W. H. Odell, entitled "Steam on the Canals," which embodied some advance sheets of Mr. Seymour's report on tests.

THE LUMBERMAN'S DIRECTORY OF SAW MILLS, shingle mills, and other wood working factories in the Northwest, South and Southwest. Arranged by railroads, rivers, and seaports. $3.00. W. B. Judson, publisher, Editor *Northwestern Lumberman*, Chicago.

This directory, which has just made its appearance, is freshly compiled, and its contents very conveniently arranged, with an index. It gives the population of each town and the names of those engaged in lumbering interests. It contains 190 large pages, and is well printed and bound with flexible cloth covers. A number of maps are interspersed throughout the work.

ILLINOIS MANUFACTURERS' DIRECTORY; containing a complete list of manufacturers of every description, alphabetically arranged by towns and business, showing at a glance whether steam or water power is used. $2.00. Fox, Cole & Co., Chicago, Ill.

The above title indicates what this directory contains. It takes the towns systematically, gives their population and designates manufacturing establishments of every kind. The second part of the directory classifies the manufacturers and shows what kind of power is used. The work seems to be very full and complete, and will prove valuable to a large class of business men.

## Questions and Answers.

*Under this head we propose to answer questions sent us, pertaining to our specialty, correctly and according to common sense methods.*

(1) J. D. S., Monrovia Mills, Md., writes: I desire to know the value of castor oil for machinery. Is there any acid in it? If you have any articles upon castor oil as a lubricant please send me the same, in order that I may obtain some light. *A.*—Castor oil has an exceedingly heavy body and at a temperature of 59° Fahrenheit has a specific gravity of .9667, while the best bleached winter sperm has a specific gravity of .8813, and lard winter a specific gravity of .9175. Castor oil is an exceedingly durable lubricator. During some tests which were made, on a testing machine belonging to the Lake Shore and Michigan Southern Railway, fifty drops of the different oils tested were used at one application, and the machine, which has a journal corresponding to the size of a car journal and subjected to an equivalent pressure, was driven at a speed representing 35 miles per hour, until the temperature shown by the thermometer rose from 60° to 200° Fahrenheit. The following is a summary of the test which shows the endurance of the oils tested:

| | | | |
|---|---|---|---|
| Castor, | 12,946 rev. | West Va., | 7,915 rev. |
| Paraffine, | 11,685 " | Sperm, | 7,912 " |
| Mecca (black) | 9,982 " | Tallow, | 7,794 " |
| Neatsfoot, | 8,277 " | Lard, | 7,377 " |

These tests have been criticised, but as the railroad company continued to use the cheaper oils it may be taken as evidence that they are at least approximately correct. There are some objections to the use of castor oil for general lubrication, the most prominent of which is its cost. For an exhaustive treatise on the subject of lubrication, and the practical value of different oils, we refer you to a little book on Friction and Lubrication, by Prof. R. H. Thurston.

(2) R. E. S., Springfield, O., writes: To settle a dispute between two railroad men, the following question has been left to me to find out: What part of a locomotive crank is the largest? Also, which is the proper position in which to place the crank pin in keying up the rods? *A.*—It is understood that a locomotive crank pin wears of an oval shape, and the longest diameter of that oval must necessarily be the position of the pin where the rod imparts no power to the crank. The position is claimed, by some, to be the exact dead center, which is not true; because if the engine has any lead the steam enters the cylinder before the crank reaches the dead center, and where there is no lead the compression alone begins as soon as the exhaust closes. This position is different upon different engines depending upon the lead and lap upon the valve. Placing the crank about 3″ behind the dead center in moving the engine ahead will give the position referred to approximately. In keying up the parallel or side rods the cranks should be placed upon the centers and the rod adjusted so that it can be moved by the hands, after which the cranks should be placed upon the opposite centers and tested by shaking with the hands. If there be a variation, as is frequently the case with pins that are well worn, the difference should be divided between the two ends.

*Q.*—Do you know of any locomotives built in which, by shoving the valve so far ahead as to strike the inside of the steam chest that the exhaust port would be opened? This question came up in disconnecting a cross head and blocking the cross head at the front end of the guides. In moving the valve well ahead will the exhaust port be partly opened or not? *A.*—In some locomotives there is room enough inside the steam chest to allow the valve to pass far enough to open the exhaust port. This, of course, depends upon the size of the valve and the steam chest. In some locomotives that have a large valve there is not room to allow the valve to travel far enough to open the exhaust port, but such cases are very rare. In answer to the question we would say, yes, generally. In case of the breaking of a pin, rod, or cross head, or in any case where one side of the engine has to be disconnected, the proper way is to block the cross head at one end of the stroke, open the cylinder cocks and place the valve upon the center (and not push it ahead or back) so as to cover all the ports. The stuffing box gland should then be tightened so as to securely hold the stem from moving. Leaving the cylinder cocks open will relieve any pressure that might otherwise accumulate in the cylinder. The leakage will not do any harm.

## Business Specials.

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Howard S. Abbot, Attorney at Law and Solicitor of Patents, 617 7th Street, N. W., Washington, D. C. Personal attention given to cases in Patent Office.

Alfred Wilkinson, Engineer and Mechanical Draughtsman, can be consulted on all matters connected with the economical use of steam; 506 Walnut Street, Philadelphia. Engines indicated, power measured and valves adjusted for best results.

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See Christiana Machine Co.'s adver., next number.

The $4 Drill Chuck, 0 to 9-16. Sent free on receipt of price. Address A. F. Cushman, Hartford, Conn.

Engines repaired without loss of time. L. B. Flanders Machine Works, Philadelphia, Pa.

Paper Making Machinery—Makers of above from fibrous material as wood, esparto grass, etc., send address to Joshua Rose, P. O. Box 3306, N. Y. City.

Rules for Engineers, and Removal of Scale in Boilers. Send for Circular. Ranken Scale Co., 50 Federal Street, Boston.

Dixon's Traction Belt Grease. Dixon's Founders' Perfect Wash. Dixon's Plumbago Foundry Facing. Dixon's Graphite Machine Grease. Dixon's Everlasting Graphite Axle Grease. Dixon's Dry American Graphite Perfect Lubricator. Send for explanatory circular to Dixon Crucible Co., Jersey City, N. J.

Manual of Power for Machines, Shafts, and Belts, with the History of Cotton Manufacture in the United States, by Samuel Webber, C. E., copyrighted 1879. Only work of the kind extant; 240 pages. Price $3. Address, D. Appleton & Co, New York, or the author, Manchester, N. H.

Sheet Metal Presses. Ferracute Co., Bridgeton, N.J.

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Latest and best books on Steam Engineering. Send stamp for Catalogue. F. Keppy, Bridgeport, Ct.

## MANUFACTURES.

The Pennsylvania Steel Company are increasing the capacity of their works, at Steelton, Pa., by the erection of a large Siemens plant and a Bessemer plant of three vessels.

The Detroit, Mich., Car Spring Works are being enlarged by the addition of a brick building 45x105 feet, which is to be used for the manufacture of elliptic springs.

The Seeger Manufacturing Company is a new concern, who will engage in the manufacture, at Springfield, Mass., of such screws as are used for presses of all kinds, vises, clamps, chairs and piano stools, jack screws, &c.

The Vulcan Iron Works of Chattanooga, Tenn., will be sold at public auction on the 10th of November, 1880.

Agricultural implements and machinery are being shipped from this city, says the Philadelphia *Trade Journal*, to California at present in larger quantities than ever before.

The Bibbs Manufacturing Company of Macon, Ga, are enlarging their works and getting in new machinery.

Forty thousand dollars have been subscribed for a cotton mill at Rodney, Miss., and three new cotton mills are planned or in process of building in South Carolina.

The Dauntless Manufacturing Company of Norwalk, O., have resolved to issue $45,000 in new stock.

Griffith & Wedge, Zanesville, O., are making an addition to their foundry which will cover an area of 4,000 square feet.

The Putman Foundry, Zanesville, says the Cleveland *Trade Review*, has been sold to C. T. DeVelling & Co., It will at once be repaired and the capacity enlarged.

The directors of the Powell Tool and Plaster Company propose in the near future to build a large factory adjoining their present establishment on Elm street.—*Cleveland Sentinel.*

The machine shops of Duvall & Co., Zanesville, O., are running fifteen hours a day; yet they have been obliged to refuse some orders. Portable engines constitute a leading specialty.

The Innis Manufacturing Company, Oil City, Pa., says the *Industrial World*, have just commenced working in their new foundry in which they have a 48 inch cupola, a new 40 foot crane, and all the other conveniences necessary to make a foundry complete.

The Dickson Manufacturing Company, of Scranton, Pa., have received a large order for machinery to be used in the development of the extensive salt mine of the American Salt Company, at New Iberia, La.

Smith, Vaile & Co., builders of steam pumps, Dayton, O., have purchased grounds on the opposite side of the river from their present works, on which, in the spring, they will erect a new factory, of sufficient capacity to employ a force of 300 hands. They now employ about 100 hands. The new works will be furnished with a large amount of new machinery in addition to that employed in the present factory. When the new buildings are completed the old works will be vacated and used for other purposes. —*Chicago Industrial World.*

Work at the various ship-yards in Camden is gradually on the decrease. Little new work is now being done, the contracts for building new vessels having been nearly completed, and no others have been made.

The Renfrew Manufacturing Company of Adams, Mass., have decided to build a mill for the manufacture of domestic ginghams, and ground has already been broken for that purpose. The main building will be 394 feet by 135, one story and of brick. Five hundred looms will be put in at first and others added as needed from time to time, the mill having a capacity of 1000 looms. The mill will employ 350 or 400 hands.

The Emerson Saw Works, Beaver Falls, Pa., are erecting an additional stone building, 105×48 feet.

Hopkins Manufacturing Company, Chicago, are putting up new shops for the manufacture of agricultural machinery. They will employ 150 men.

The Chicago Electric Manufacturing Company has been incorporated, with a capital of $20,000, for the manufacture of a general line of electrical goods. The incorporators are: W. P. Manierre; Richard J. Pendergrast and Henry B. Porter.

The Oneida Steam Engine and Foundry Company, Oneida, N. Y., recently received an order for eight engines to be sent to Mexico, soon. Twenty-five more are expected to be ordered sent to the same quarter as soon as they can be got out. The hands are making three hours extra time daily.

G. M. Benson, Cleveland, O., manufacturer of stair machinery, has built a new shop. It is three stories in height, 55×50 feet.

Rowley & Hermance, Williamsport, Pa., have sent several lots of wood-working machines to Europe, on orders.

William L. Burt and others have filed articles of incorporation, at Albany, N.Y., of the Post Office Marking and Cancelling Machine Co., with a capital of $500,000.

Ninety-five per cent. of the patent enameled leather made in the United States is manufactured in Newark, N. J.; and there is scarcely a place upon the habitable globe where Newark leather is not sent.

The Agricultural Works at Akron, O., will be completed by January 1. The main building is to be 200×60, and three stories high. There is to be a machine shop, 200×60; a foundry, 130×60; blacksmith shop, 50×60; scratch shop, 130×60; tumbling room, 50×60.—*Trade Review.*

It is intended that the Wm. Anson Wood Reaper and Mower Works, Youngstown, O., shall be put in operation by the first of December.

Wm. Sellers & Co., of Philadelphia, are shipping nine turntables to Australia.

The Rippetoe iron estate in Augusta county, Va., has been sold to parties from Youngstown, O., and Pittsburgh, who intend to build a large blast furnace on the property.

The Clarksville Paper Company, of Clarksville, Pike County, Mo., has been incorporated with a capital of $15,000, one-half paid up.

The flax mills at New England Village, Mass., began work a week ago with fifty hands, most of them from Scotland. The number will be increased to 100 in a few days.

A. B. Meyer is having a new thirty-five horse power steam engine built at the Broadway Foundry for a new manufacturing establishment, which he proposes starting in this city at an early day.—*St. Louis Age of Steel.*

Wood Brothers are to build a large woolen mill on their property at Camden, N. J.

The foundries and machine shops of Raleigh, N. C , are running day and night to fill orders.

This year $75,000 will be invested in Charlotte, N. C., in manufacturing interests.

The Gold Medal Sewing Machine Company of Orange, Mass., broke ground recently for an addition to the new shop, which is to be 130 feet long, 50 feet wide, and two stories high.

Work on the new paper mill at Northampton, Mass., has been started.

The Concord, N. H., Carriage Company are building an addition, 95 × 28 feet, to their manufactory, and when completed, will lagely increase their force of workmen.

The locomotive works at Schenectady, N. Y., are being enlarged by an addition, 170 × 60 feet, which will contain two new hammers, each operated by eleven men. These works now employ 750 hands, and turn out twelve engines monthly.

### Machinists' and Engineers' Supplies.

NEW YORK, October 7 1880.

Although nearly all establishments manufacturing metal goods, are well supplied with orders, trade is becoming somewhat slack in general supplies for shops. Tools, however, are in good demand. Prices are, as a rule, well maintained though the tendency is downward rather than upward. Wrought iron pipe, which is as good a barometer of the supply trade as any single commodity, stands quite steady indicating fair weather for manufacturers and dealers.

The Seeger Mfg. Co., Springfield, Mass., have just started to manufacture a new bell jack made with a patent cast seamless screw. It is claimed that these screws possess a wearing surface much better than any cut screw and are less liable to twist or bend out of shape. The jacks are offered at a very low price and appear to have a good degree of power and durability.

Chase, Reed & Co., Higganum, Conn., have just brought out Hayden's Wrench made of malleable iron, annealed. It has a screw for adjustment and is very compact and substantial. The six-inch wrench sells in six dozen lots at $2 25 a dozen. The same firm are about to introduce new cutting pliers which are said to cut large wire with an expenditure of but little muscular power.

### Iron Review.

NEW YORK, October 7, 1880.

The inquiry for pig iron continues good but the transactions particularly in domestic iron have been comparatively few. Prices are more in favor of the buyers than last week. We quote Foundry No. 1, at $25. Foundry, No. 2, $20. Grey Forge $19.50@$20.50. There is a slight improvement in the prices of old rails but no change in values. Manufactured iron also remains the same as last reported.

We quote as follows:

Iron Rails, $50 to $53, according to weight; Fish Plates, 2¾c. per lb.; Railway Spikes, 3¼c.; Bolts and Nuts, 3½c.; Common Bar Iron, 2.4c., basis from store, Refined do. 2.6c., basis; Ulster, 3.6-10c. basis; Machinery Steel, 6¼c.; Best Tool Steel, 13½c.; Norway Bar Iron, 6¼c.; Norway Shapes, 6¾c ; Nail Rods, 6¾c.; Sheet Iron, 3½c., basis; Angle Iron, 3¼c.; Tee Iron, 3¾c.; Band Iron, 3.4c.; Hoop Iron, 3.6c., and up according to size; Horse Shoe Iron, 3.5c.; Hot Polished Shafting in lengths, 2 ft. and longer, 9 to 10½c., according to size; Small Black Rivets, 30% off in papers; 10% off in bulk.

Carmichael & Emmens, 130 Cedar St., New York, quote prices of Boiler Makers' Supplies from store as follows:

| | |
|---|---|
| Flange Iron | 5¼ |
| C. H., No. 1, Shell Iron | 4¼ |
| C. No. 1 Iron | 4 |
| Tank Iron | 3¾ |
| Sheet Iron | 3½ |
| Angle Iron | 3½ |
| Bead Iron | 5½ |
| Burden Boiler Rivets | 5 1-10 |

Boiler Tubes at 40 per cent. discount off list.

### Metal Review.

LUCIUS HART & CO., 8 & 10 Burling Slip, New York, furnish us the following, under date of Oct. 7, 1880:

No material change in metals during the last week. Business confined to jobbing lots. Importers and large holders unwilling to accept current prices Pig Tin having advanced to £85.10, has receded to-day to £84, with strong market. Singapore, $20¾. Would quote spot market: Banca Tin 24¾c.; Malacca and Straits 20c.; Australian, 19¾c. Billiton, 19¼c.; "Lamb & Flag" 19¾c. to 19½c.; Pig Lead, 5c. to 5¼c., as to lots. Antimony, 15c. to 16c., as to brand Spelter, Domestic, 5¼c.; "Bertha," pure, 8c. to 8¼c.; Silesian, 6c.; No. 1 Solder, 11c.; "Half and Half," 13c.; Bismuth, $2.50 to $3.00 per lb.

## WANTED.

Wanted—Machinists—Six strictly first-class Vise hands and Fitters accustomed to building machine tools; liberal wages paid by Niles Tool Works, Hamilton, Ohio.

A young Swede, graduated from Technological Institute, with experience as draughtsman in marine engine works, desires a position as draughtsman. Address Swede, P. O. Box 964, Fitchburg, Mass.

The advertiser has had long and successful experience in the design and construction of machinery and shop management; is of middle age, and thorough business habits; will be open for an engagement early in 1881, and solicits correspondence. Address B., office of AMERICAN MACHINIST, 96 Fulton Street, New York.

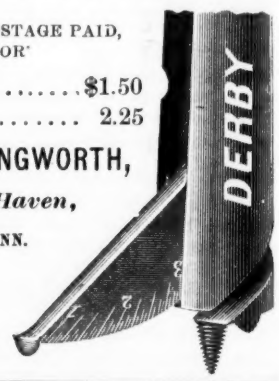
Wanted.—A reliable second hand Richards Indicator. Address with price and particulars, C. W. N., office AMERICAN MACHINIST.

A first-class Machinist wishes a situation; is well acquainted with pipe foundry crane work. Address A. C., Box 280, Bordentown, N. J.


MAILED, POSTAGE PAID, FOR

¾ to 2 inch.....$1.50
⅞ to 3 inch..... 2.25

F. CHILLINGWORTH,
*New Haven,*
CONN.



*The BEST are CHEAPEST.*
Our New No. 3
FLEETWOOD, and DEXTER-C
SCROLL SAWS
are unequalled in **Workmanship, Accuracy and Durability.**
Trump Lathe CHUCK, for small Drills, under ¼—3 Jaws—self-centering—accurate, all hardened steel. Price, $1.50 to $2.25.
TRUMP BROS. MACHINE CO.
Wilmington, Del.

A PARTNER WANTED.

The undersigned is proprietor of an extensive machine shop, foundry, blacksmith shop, &c., in Fond du Lac, Wis., stocked with first-class Tools, among which is a Planer for planing 20 feet long, 4 feet wide and 4 feet high, made by the Putnam Machine Co., also a Lathe of 7 feet swing and 20 feet bed, made by the same company. *The shops and Tools are nearly new*, and now running on Engines, which it is intended to make a specialty of manufacture, but owing to the pressure of other business the proprietor is *unable to give his personal attention* to the same, and, therefore, wishes to associate with himself a practical business man of experience in this line to take charge of the business, and who could also furnish a portion of the capital required. The business is free from all indebtedness, and the principal part of the capital necessary for operating the works can be furnished by the present proprietor. Address,

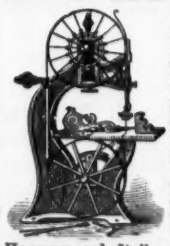
CHARLES J. L. MEYER, Fond du Lac, Wis.
September 25, 1880.

WILLIAM COOKE,
(Successor to COOKE & BEGGS),
*6 Cortlandt Street, New York.*
*AGENT FOR*
The Waters Perfect Governor,
Having Adjustable Speed, Automatic Safety Stop, Sawyer's Lever, and Solid Composition Valves and Seats.

ALSO, DEALER IN
SUPPLIES
For Machinists, Railways, Mills, Mines, &c.

Please send for circular and state that you saw the advertisement in this paper.

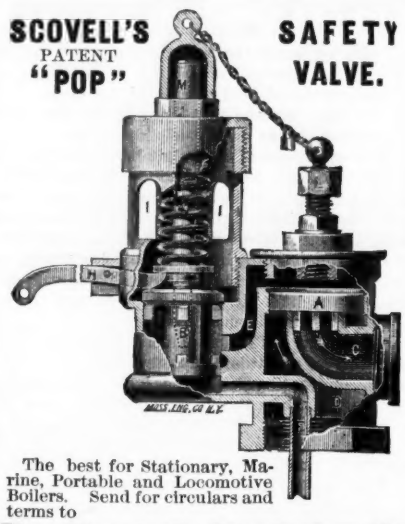
WOOD WORKING MACHINERY.
J. A. FAY & CO.,
BUILDERS OF
IMPROVED MACHINERY FOR WOOD CUTTING.



Numbering some 300 different Machines—Planing and Matching Machines, Surface Planing Machines, Molding and Tenoning Machines, Mortising and Boring Machines, Carving and Dovetailing Machines, Shafting and Friezing Machines, Horizontal and Vertical Boring Machines.
Improved Variety & Universal WOOD WORKERS.
Band, Scroll, Ripping and Cutting-off Saws, Band and Circular Resawing Machines, Spoke and Wheel Machinery, Shafting, Hangers and Pulleys, etc., etc. Original in design, simple in construction, perfect in workmanship, saves labor, economizes lumber, and its productions are of the highest standard of excellence. *Send for Circulars and Prices.*
J. A. FAY & CO., Cincinnati, Ohio, U.S.A.

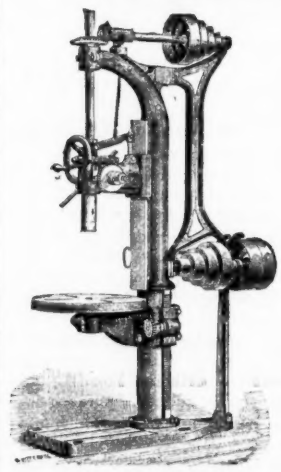
ANEMOMETERS OR AIR METERS
For measuring the velocity of air currents in mines, sewers, hospitals, etc. Instruments of precision used in civil and mechanical engineering imported and manufactured by
JAMES PRENTICE,
164 BROADWAY, NEW YORK.

SCOVELL'S PATENT "POP" SAFETY VALVE.



The best for Stationary, Marine, Portable and Locomotive Boilers. Send for circulars and terms to
The Hancock Inspirator Co.
34 Beach Street, Boston, Mass.

PRENTICE BROTHERS,
Manufacturers of



Machinists' Tools,
Engine Lathes,
11, 14 and 16 in. swing,
Hand or Speed Lathes,
from 10 to 20 in. swing.
Foot Power Lathes,
Upright Drills,
Slide Rests,
Planer Centers, &c.
WORCESTER, MASS.

GEO. W. FIFIELD,
Manufacturer of ENGINE LATHES from 16 to 48 in. swing. Cuts, Photographs and Prices furnished on application. LOWELL, MASS., U. S. A.

C. W. LeCOUNT,
South Norwalk, Connecticut,
Manufacturer of
LeCount's Improved Steel Dog

With hardened Steel Screws turned in the Lathe.

PRICES.

| | | | |
|---|---|---|---|
| No. 1.... | ¾ | in... | $ .40 |
| " 2.... | ½ | "... | .50 |
| " 3.... | ¾ | " .... | .60 |
| " 4....1 | | " .... | .70 |
| " 5....1¼ | | " .... | .85 |
| " 6....1½ | | " .... | .95 |
| " 7....1¾ | | " .... | 1.10 |
| " 8... 2 | | " .... | 1.20 |

SMALL SET, $6.30.

| | | | |
|---|---|---|---|
| No. 9...2½ | | in.... | 1.40 |
| " 10.. 3 | | " .... | 1.60 |
| " 11...3½ | | " .... | 1.80 |
| " 12.. 4 | | " .... | 2.00 |

FULL SET, $13.00.

KEARNEY & FOOT

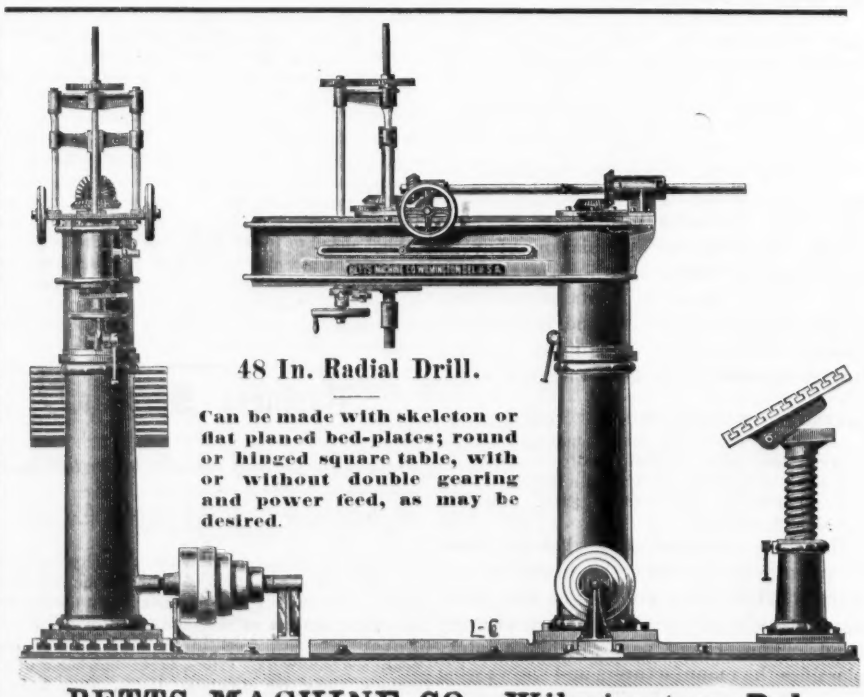
Office, No. 78 Chambers Street, N. Y. — Full Weight Hand-Cut Files. — Manufactory, PATERSON, N. J.

The best and cheapest in the end. Send for quotations. The files speak for themselves in the following testimonials. Read them.

MESSRS. KEARNEY & FOOT, Brooklyn, N. Y., May 24th, 1877.
*Gentlemen:*—We have used your Files, more or less, for several years, and we take pleasure in saying that both the new and re-cut Files have given entire satisfaction. Yours truly,
BLISS & WILLIAMS.

FARREL FOUNDRY AND MACHINE CO.
JAS. D. FOOT, Esq., Waterbury, Conn., Nov. 8th, 1878.
*Dear Sir:*—Please forward the order for Files given you a few days since.
Your Files have been uniformly satisfactory to us. Yours respectfully,
FARREL FOUNDRY & MACHINE CO., E. C. LEWIS, Ag't.

We print instructions on the use of Files, and also give the diameters of round and square Files from 3 to 16 inches. They are on card board, 10x12 in., and are intended to be put up in the shop for the men to read. We are pleased to mail them to any manufacturer on receipt of the necessary 6 cents postage.
Respectfully, KEARNEY & FOOT.



48 In. Radial Drill.

Can be made with skeleton or flat planed bed-plates; round or hinged square table, with or without double gearing and power feed, as may be desired.

BETTS MACHINE CO., Wilmington, Del.
MAKERS OF ALL KINDS OF MACHINE TOOLS.

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SOLE MANUFACTURERS OF

# FILES AND RASPS

HAVING THE INCREMENT CUT.

Also, FILERS' TOOLS and SPECIALTIES.

"Nicholson File Co's" Files and Rasps.
"Double Ender" Saw Files.
"Slim" Saw Files.
"Racer" Horse Rasps.
Handled Rifflers.
Machinists' Scrapers.
File Brushes, File Cards.
Surface File Holders.
Vice File Holders.
Stub Files and Holders.
Improved Butchers' Steels.

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## NEWARK STEEL WORKS.

BENJAMIN ATHA & CO.

MANUFACTURERS OF

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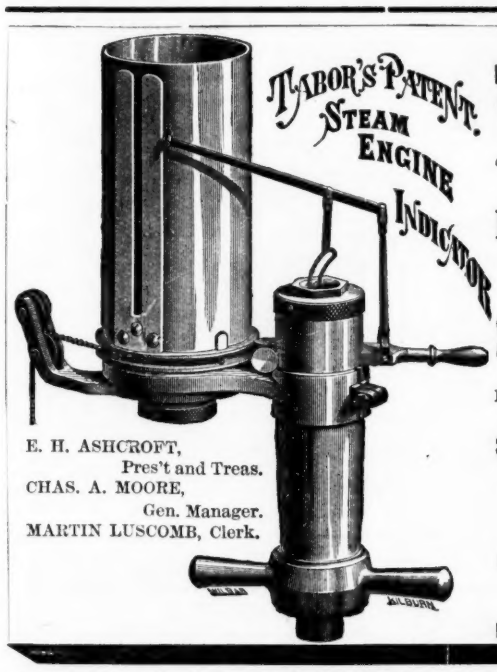
WE MAKE GRADES OF STEEL SPECIALLY ADAPTED TO THE MANUFACTURE OF LATHE TOOLS, CHISELS, TAPS & DIES

BENJ. ATHA. NEWARK, NEW JERSEY. J. ILLINGWORTH.

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## The Ashcroft Manufacturing Co.

Successors to E. H. ASHCROFT,
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*THE E. H. ASHCROFT*
Improved "Bourdon" Steam Gauges.
Sole Owners and Manufacturers of
TABOR'S PATENT
STEAM ENGINE INDICATORS.
Specially adapted to
Indicating High Speed Engines and Locomotives.
STEAM AND WATER GAUGES,
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*BOSTON, MASS.*
Factories, BOSTON & LYNN.

E. H. ASHCROFT, Pres't and Treas.
CHAS. A. MOORE, Gen. Manager.
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## RALPH R. OSGOOD'S BOOM DREDGE.

Adapted to all kinds of under-water excavation. Guaranteed to excavate 50 per cent. more material from hard bottom than any other machine made, all things being equal. Illustrative pamphlets, comparative strain sheets and estimates furnished on application. ☞ See AMERICAN MACHINIST of July 31, 1880. Address

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☞ When in New York City will be 81 Astor House.

STEPHENS' PATENT PARALLEL VISE and attachments, adapted to every variety of work from Jewelers' to Locomotive Shops. It opens **further**, holds **firmer**, is **heavier** and more **durable** than any other vise. For sale by the trade.

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# FRICTION CLUTCH PULLEYS AND CUT-OFF COUPLINGS,

JAS. HUNTER & SON. North Adams. Mass.

# AKRON IRON COMPANY,

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SOLE MANUFACTURERS OF

# Patent Hot Polished Shafting.

This shafting commends itself to the trade generally as superior to any shafting ever before introduced to the market for the following reasons, viz.:

**1st.—It is perfectly straight and round.**

**2d.—It can be rolled accurately to any desired gauge.**

**3d.—It has the beautiful blue finish of Russia Sheet Iron, rendering it less liable to rust or tarnish than shafting of the ordinary finish.**

**4th.—It will NOT SPRING OR WARP IN KEY SEATING like most of the other manufactured shafting sold in the market, and, as a consequence, is admirably adapted for LINE AND COUNTER SHAFTING.**

**5th.—The surface is composed of MAGNETIC OXIDE OF IRON, forming a superior journal or bearing surface.**

**6th.—It is made of superior stock.**

Price lists, with references and other information, furnished on application to us.

AKRON IRON CO., Akron, Ohio.

Or to our Agent,

E. P. BULLARD, 14 Dey Street, New York City,

General Agent for N. Y. City and other Eastern States.

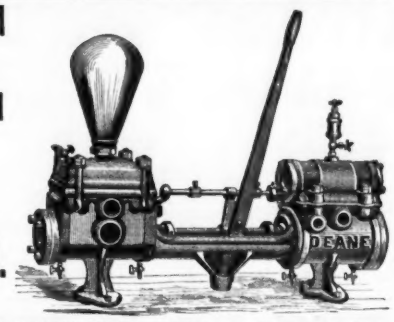
# DEANE'S PATENT STEAM PUMPS

FOR SIMPLICITY OF MECHANISM

—AND—

EFFICIENCY IN OPERATION

THEY ARE UNEQUALED.

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Send for Illustrated Catalogue and Price List.

## BRADLEY'S CUSHIONED HELVE HAMMER.

Awarded first premium, Silver Medal at American Institute Fair, 1873, Cincinnati Industrial Exposition, 1874, and the Diploma of Honor and Grand Medal of Merit at the Centennial Exhibition, in 1876,

Being the highest award given any goods of their class in America or Europe.

IT HAS MORE GOOD POINTS, LESS COMPLICATION,
MORE ADAPTABILITY, LARGER CAPACITY,
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Send 10 cents for 96 page Catalogue of Books for Machinists and Engineers.

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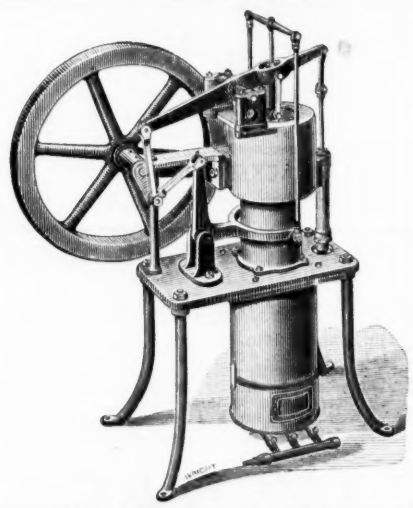

ERICSSON'S NEW PATENT CALORIC PUMPING ENGINE is specially intended for domestic use in lifting and forcing water from wells and cisterns, or from Croton pipes, to tanks on upper floors of buildings in city or country.

This pumping engine is entirely safe, no steam being employed, and is not liable to derangement.

All kinds of fuel will answer for this engine, but coal-gas is preferable, the consumption being only 15 cubic feet per hour. Besides gas is handier and cleaner than coal or other combustibles. Servant girl can operate it!

Price for 8-inch cylinder, pumping 250 gallons per hour 50 feet: With gas furnace, - $260 00
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Price for 6-inch cylinder, pumping 200 gallons per hour 50 feet: With gas furnace, - $210 00
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Manufactured by the Delamater Iron Works.
C. H. DELAMATER & CO., Proprietors,
No. 10 CORTLANDT ST., N. Y. CITY.

## COLUMBIA BICYCLE.

Bicycle riding is unsurpassed as a method of traveling, whether for speed, sport, or the renewal of health. The practicability of the machine has been thoroughly tested, and satisfactorily proved beyond question. Thousands are in daily use, and the number is rapidly increasing. The exercise is recommended by the medical profession as most beneficial to health, bringing into action almost every muscle of the body. Send 3c. stamp for illustrated catalogue containing price list and full information.

THE POPE MFG. CO.
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# FOR SALE.

2 No. 2 Second-Hand MacKenzie Cupolas.
1 No. 2 " " " Blower.

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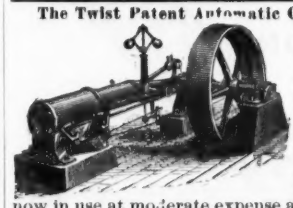
KNOWLES STEAM PUMP WORKS,
44 Washington St., Boston.

**The Twist Patent Automatic Cut-off Engine**



is a first-class Engine in every respect. The valve gear is of the disengaging type, is exceedingly simple, accessible & durable. Cylinders with this cut-off can be pieced on any engine now in use at moderate expense and will save from 30 to 50 per cent. in fuel over the plain slide valve and throttle governor. Also, Vertical and Yacht Engines.

NELSON W. TWISS,
25 Whitney Ave., New Haven, Conn.

# Worthington Steam Pump.

For all Purposes and of all Sizes.

SPECIAL PATTERNS

FOR

Railway Water Stations, Oil Pipe Lines, Hydraulic Elevators, etc.

SEND FOR LATEST CIRCULAR.

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239 BROADWAY, NEW YORK. 83 WATER ST., BOSTON. 709 MARKET ST., ST. LOUIS.

Largest Establishment of the Kind in the World.

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J. C. MOSS, Pres't and Sup't. *Incorporated April 2, 1880.* J. E. RAMSEY, Secretary.
R. B. MOSS, Ass't Sup't.
M. A. MOSS, Treasurer. **MOSS' NEW PROCESS.** H. A. JACKSON, Ass't Sec'y.

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**IMPORTANT TO MACHINERY MANUFACTURERS AND DEALERS.**

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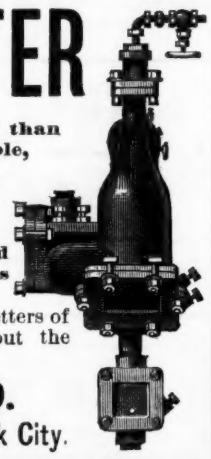

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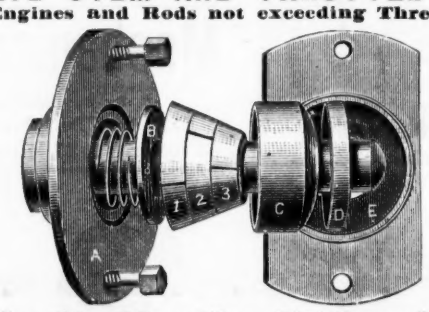


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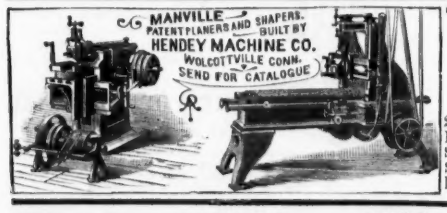


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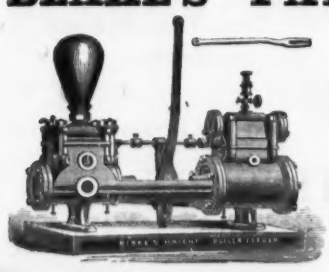

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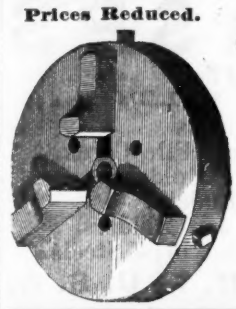

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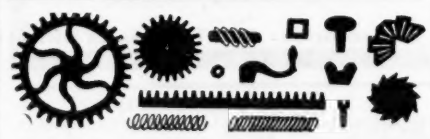

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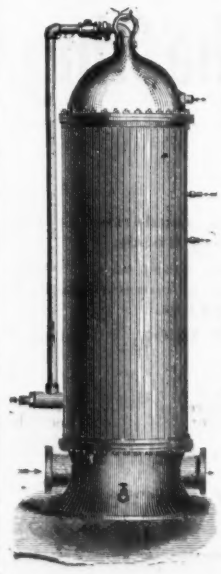

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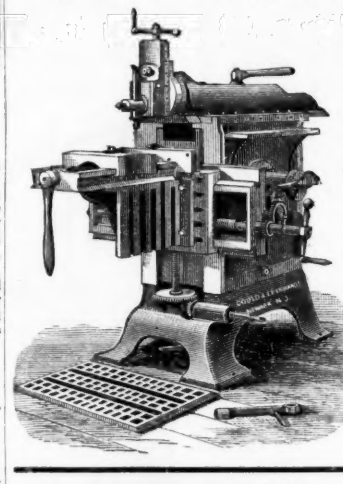

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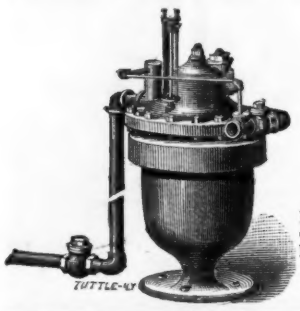

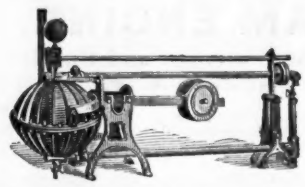

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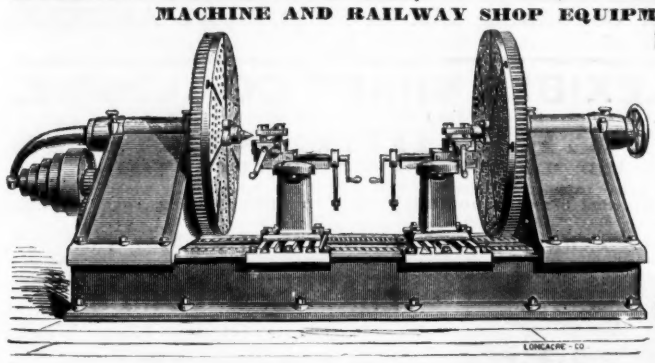

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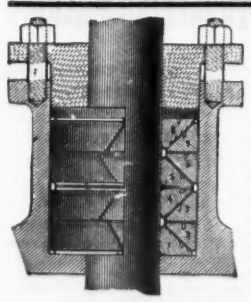

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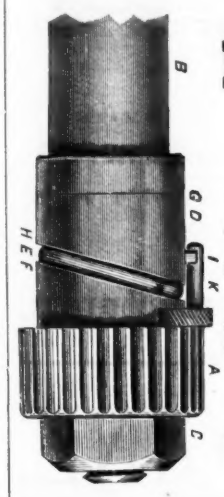


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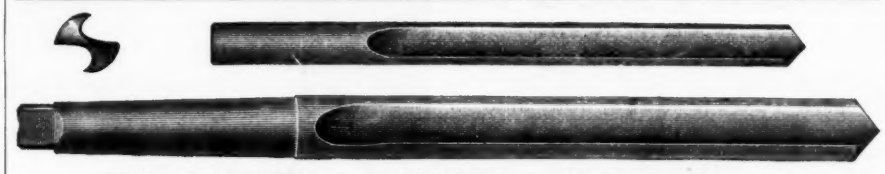

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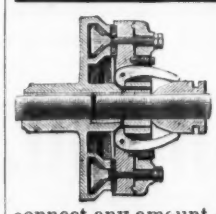

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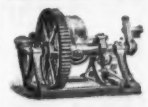

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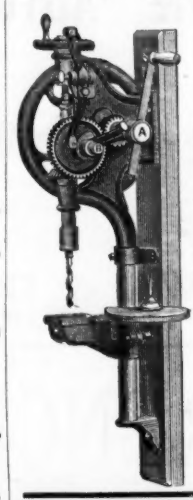

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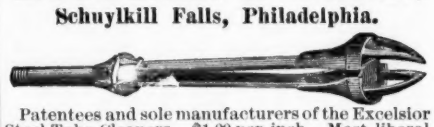

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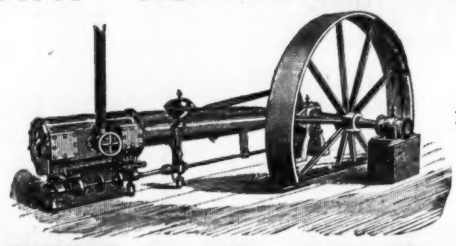

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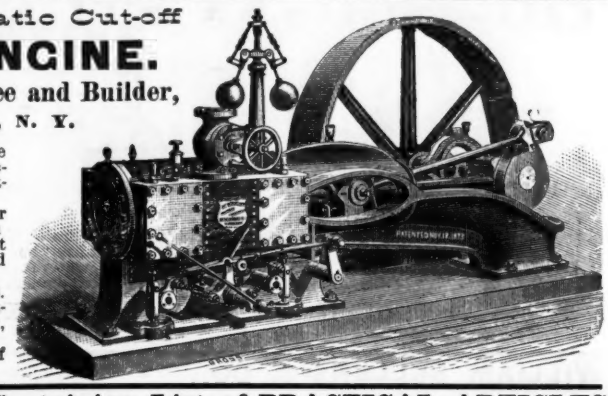

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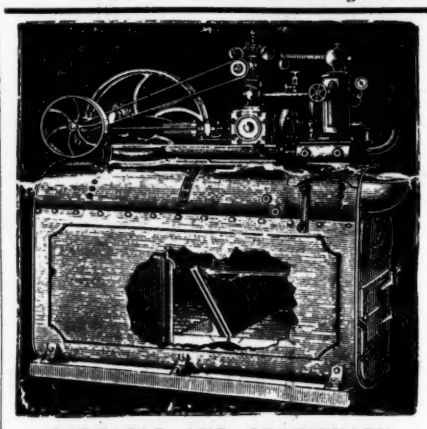

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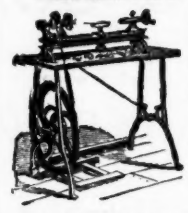

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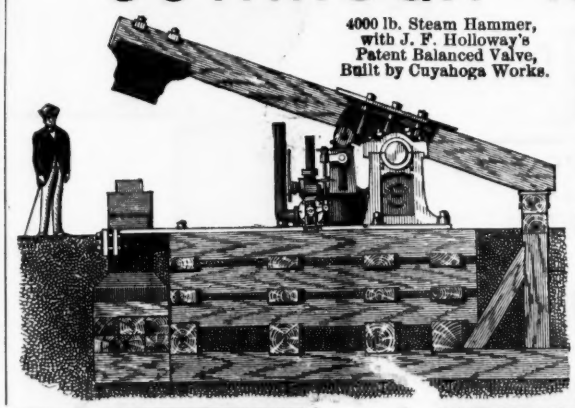

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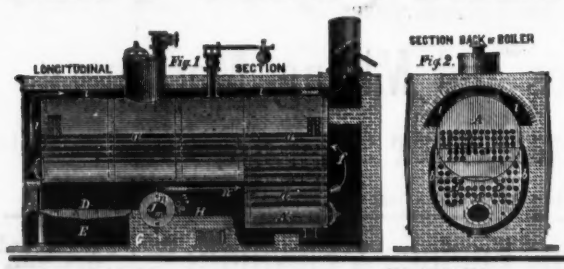


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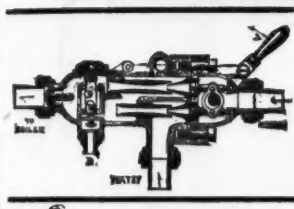

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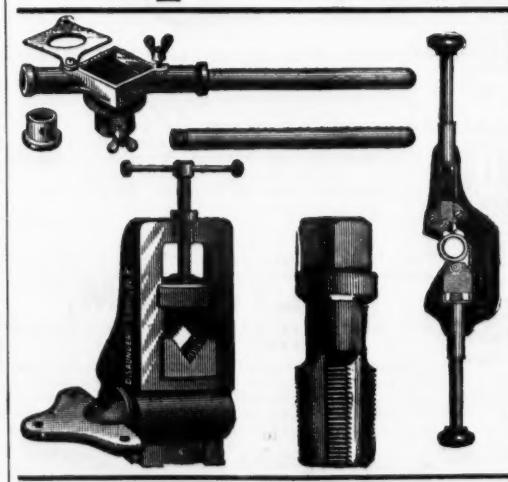

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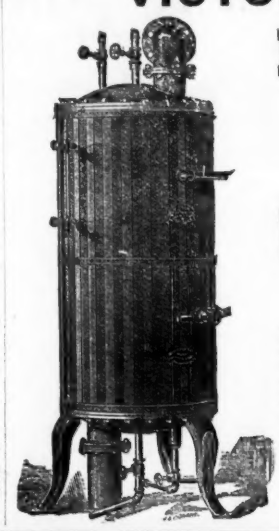

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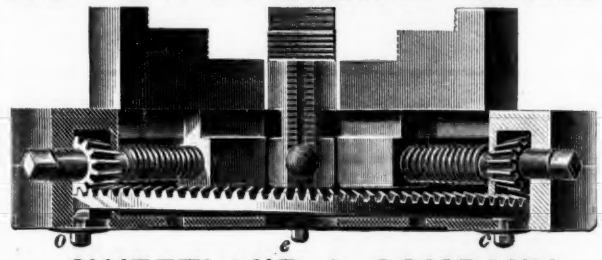


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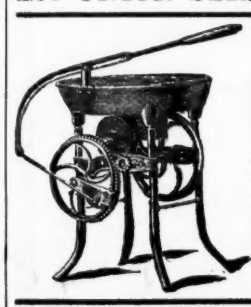

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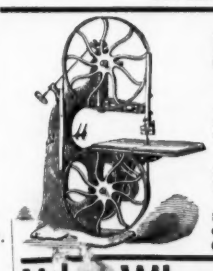

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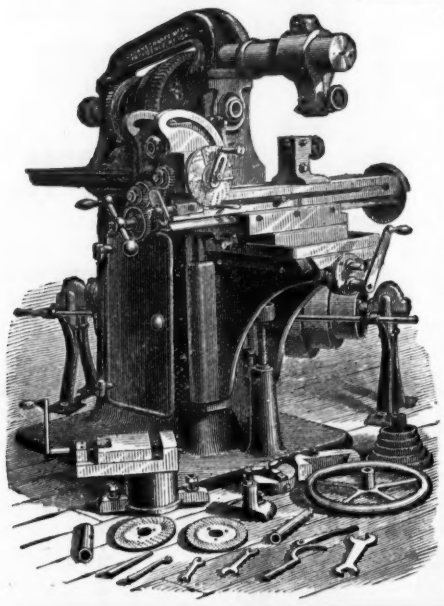

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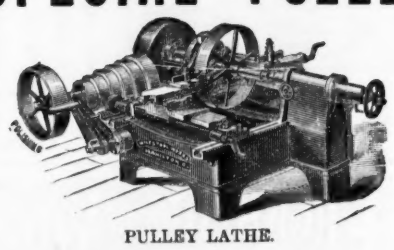

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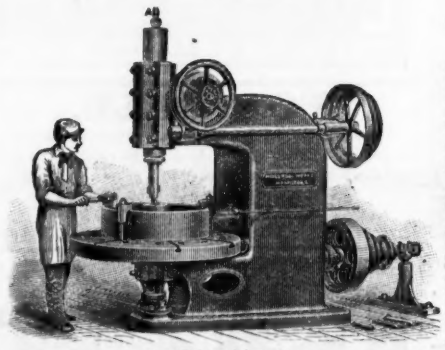

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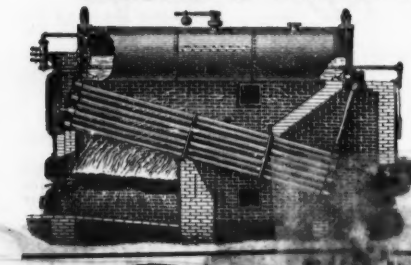

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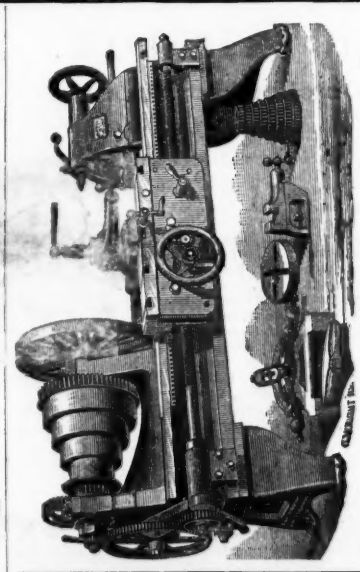

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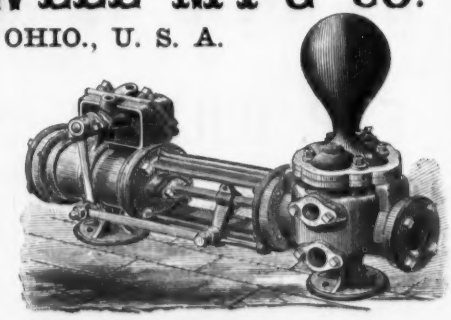

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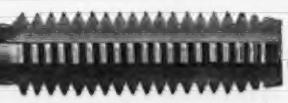

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